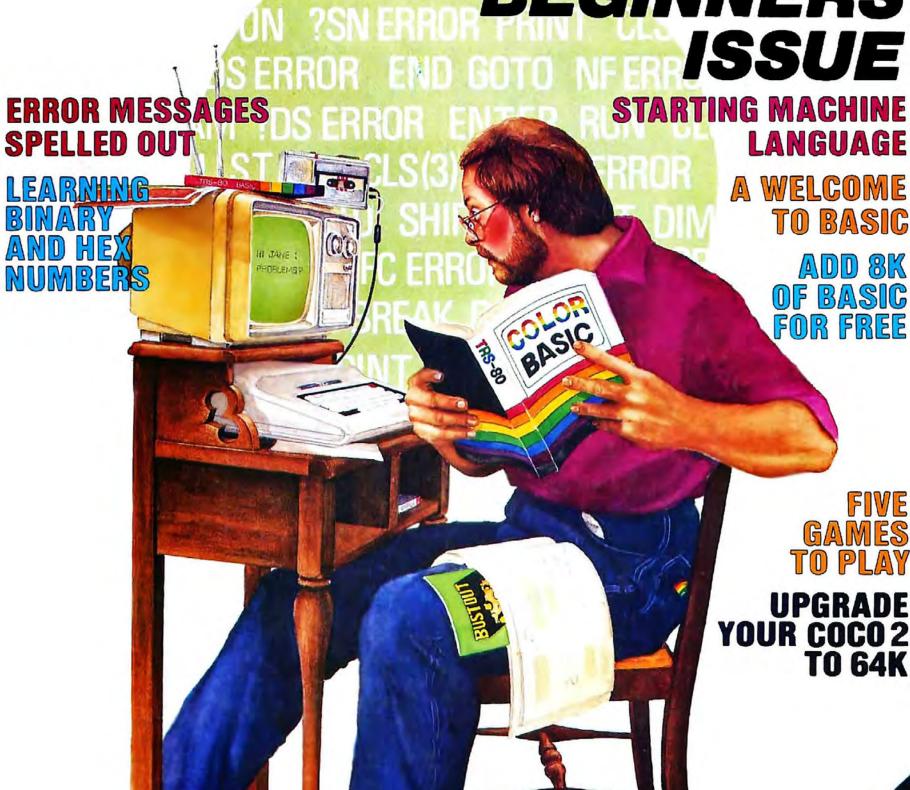


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Vol.III No. 6

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Fred W. Crawford @ 1983

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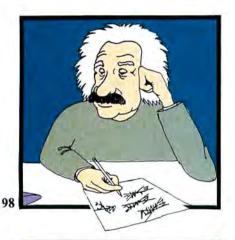
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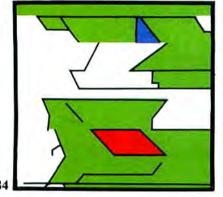
Under the Rainbow

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COVER art @ 1983 by Fred Crawford

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NEXT MONTH: February is our Adventures issue, the kickoff of our Adventure game contest. We'll announce the rules and deadlines and offer some expert advice to get you started. In addition to three new columns we'll be adding in February, we are also starting a new technical section of the magazine complete with a regular feature to answer your technical questions.

As always, we'll have a full mix of CoCo games, home help programs, utilities and tutorials, dozens and dozens of new product announcements and more than 30 hardware and software reviews.

Look for the February Rainbow for more on the Color Computer than is available from any other source.



January 1984

Vol. III

No. 6

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Limited back issues are available. Please see notice for issues which are in print and costs. Payment accepted by VISA, MasterCard, American Express, Cash, Check or Money Order in U.S. currency only.

RAINBOW

SWEET PRAISE

Editor:

I can't tell you how much I look forward to the Rainbow. I'm like a kid in a candy shop. You writers have a real flair for being concise. Top notch! All that praise, and for a magazine that doesn't even have a centerfold. Keep up the good work!

Robert A. Walker Crewe, VA

Editor's Note:

Check our January 1983 issue. It does have a foldout!

HELPFUL HINTS

Editor:

I have seen requests for locating the 5-pin joystick plugs for the CoCo. They are available with the cable attached as part number AW-2894. I paid \$1.62 for the plug with cable in July 1983.

The 4-pin plugs for serial I/0 should also be available via the same route, but I don't have a part number for them. Just ask for a replacement connector for the 26-3020 cable, or buy the 26-3020 cable which has two of the 4-pin connectors on it.

I have been a CoCo "nut" since June of this year, and have found the Rainbow to be the best buy in CoCo magazines (I'm a subscriber, but the newsstand price isn't bad for the amount of info you get in each issue).

John E. Carter Smyrna, GA

RECIPES FOR COLD POKE

Editor

In your November 1983 issue, you printed the cold poke, *POKE 113,0:EXEC 40999*, and asked for any handy uses for this poke.

What I use this poke for is to cold start the CoCo when using my disk drive, without having to extract the disk. Since the restart is done from software and not hardware, there is no flashing the head of the disk resulting in crashed disks.

Also, for what it's worth, if you EXEC 40999 without the poke, you can get a reset.

I use the cold start poke in a small program that includes the unload command followed by the poke.

David E. Fultz, Jr. Marion, OH

Editor:

In the November issue, you requested a reply from those who use the *POKE 113,0*: *EXEC 40999*. I use this poke quite often but with a slight modification, that is *POKE*

113,3: EXEC 40999. What this poke does is to reinitilaize the computer to its normal condition as when you first put it ON. It does this without shutting it down.

Each time I have entered and executed a ML routine, be it a small utility, a game or whatever, I always use this poke before load-

ing in another ML routine.

If, by mistake, I have the computer bugging, and it seems to be okay after having pushed the [RESET] button, I always do this poke to make sure that the computer is in normal working condition again. I like your magazine a lot.

Alain Dussault Quebec, Canada

TO A BETTER SKETCH

Editor:

Since the printing of my program Color Sketch in October's Rainbow, I have had several calls about running the program on a 16K machine as the article says can be done. Though it is true that the program can be run on a 16K machine, I failed to include the necessary modifications to do this. This letter will correct this oversight.

In order to run the program on a 16K machine, the following lines must be

changed:

Line 5 change to . . . CLEAR 1200,&H3EFF

Line 6 change to . . . DEF USR=&H3F00

Line 11 change to . . .
FOR MM=&H3F00 TO &H3F1B

These changes should allow 16K users to run the program with no problems. Thanks to *Rainbow* and all who have called and complimented the program.

Darryl Kotcher Canton, MI

INFORMATION PLEASE

Editor:

Do any of your readers use a Japusa MQS-80 printer with their CoCo (also known as a Tec-Writer I). I am happy with the way it works and find the text very clear considering it only has a 7-wire print head and is cheaper then a DMP 100. However, I would like to know if there is a screen-print program for it, or will most screen-print programs work? Anyone interested in sharing notes may contact me at 273 Park St. N., Peterborough, K9J-3W3.

Over the last year and a half my CoCo has grown from 4K to its present 64K ECB with direct audio and composite video out, and

the Super-Pro keyboard. In the same time I have watched *the Rainbow* grow from a few pages to its present colossus, and somehowit just gets better and better. I enjoy them both immensely. They make a perfect team. Keep up the excellent work.

Hubert Wren Ontario, Canada

Editor:

I would like to know how some of the readers come up with these poke statements for the various marketed games. How these users arrived at these specific pokes is unknown to me. Does it require a special software pack or can it be done by anybody? Also, is there anyone who knows how to get out of Ray Sato's *Dungeon of the Gods*? I have tried in vain to find the way out. It seems to have no exit.

David Ravn Jacksonville, IL

Editor:

I need a program that can permit creation of say, 20 different symbols and then will recall any of these from memory and draw them on the screen at cursor location. One should then be able to correct these (pipe fitting) symbols by 'pipe lines' to show a pipe diagram or small system. A screen dump to printer (Gemini 10X) would be required plus, if possible, an ability to add dimensions

A table, listing material type and quantities should also be 'generatable' to add to the pipe sheet — a 8½ by 11 inch printout. I'm ready to pay for a good solution if the response is rapid. Thanks *Rainbow*, for a super magazine. My son and I almost fight over who gets it first!

Mike Waters Tracy, P.Q., Canada

GAMES, GAMES, GAMES

Editor:

If someone in Cocoland has some answers to Sands of Egypt, preferably how to finish or get in the pyramid, I would appreciate it. Send all clues and solutions to me at 2830 Riverside Dr., Apt. 105 B, 33065.

Mike Rothman Coral Springs, FL

Editor:

I need help on the games Beyond the Cimmeon Moon and Poltergeist. If anyone knows any clues, please write me at Box 275 R.R.#1 Clark 41653. My main problems are finding things that are hidden on Cimmeon Moon, and getting past the third screen on Poltergeist.

Michael Rosenberg Prestonburg, KY Editor:

I have helpful hints to solving *Pyramid*. I have answers to questions such as "How do you cross the bottomless pit which is too wide to jump?"; "How do you open the sarcophagus?"; "How do you kill the serpent?"; "How do you get to the hole above the east pit in the two-pit room?"; and "How do you get fresh batteries for your lamp?" If you need help in *Pyramid*, just send a self addressed stamped envelope to 1450 Picadilly St., 23513.

Harry L. Perkins, III Norfolk, VA

PEN PALS

Editor:

I am starting a CoCo pen pal service. If there is anyone interested, please send a letter to me at 29 Eagle Rd., 07746. With your letter include your name, address, what kind of things you like to do with your computer, and 25¢. This is to provide for envelopes and stamps. I think your magazine is great. Keep up the good work!!

Michael Holzer Marlboro, NJ

KUDOS

Editor:

The Rainbow deserves a great deal of credit for the fine job it has done in bringing to light the many applications, ins and outs, intricacies, updates — in short — the word

of the Color Computer to the general public in a package that is not only relevant to the experienced computer operator, but to the novice as well. As computers become more and more a way of life, surely one day a person without knowledge of computers will be deemed "illiterate." That future may be much closer than any of us expect, and it is a comfort to know that magazines like yours are there to push us along. Keep up the good work!

William F. Jourdain Macon, GA

Editor:

I picked up my first copy of *Rainbow* in December of 82. I've loved every issue since then. Your graphics issue was spectacular.

I was astounded at Rainbow Roach. Then when Marathon hit the screen I just looked at it with awe! It took some debugging but I regret that somebody wouldn't type in that game.

Keep up the good work. Can't wait 'til next month, and the next, and the next . . .

Brian S. Graham Cleveland, TN

Editor:

This is my first letter to any magazine. You have a fine little magazine compared to others that I receive. One CoCo magazine I've read is poorly written, printed sometimes illegibly, and full of grammatical errors. Another one, although it sometimes

has good information, is so arrogant, I get turned off.

Robert I. Cheney Rio Piedras, PR

BULLETIN BOARD SYSTEMS

Editor:

I am proud to announce a new CoCo Bulletin Board. The Seven Hills Hillbilly Board of Forest, Virginia supports uploading and downloading, and has many sections. They include anything from graphics to an electronic magazine. We also have electronic mail, and a disk full of downloads. We are devoted to CoCos, but all types of computers are welcome. Currently we have Apples, Model 100s, and Commodores. We are running the most efficient software available, and it is ideal for long-distance callers. Access us at 804-525-0312.

Charles E. Moore Forest, VA

Editor:

I am the Sysop of the Colour 80 Bulletin Board, and it is open 24 hrs. It is a highly modified version of the Lee Blitch CoCo Board II. It uses Pete Lyall's new driver, along with a lot of my own modifications, to make it one of the best and fastest CoCo Bulletin Boards in the nation. It features five online games including *Star Trek* and *Eliza*, a message file called Free Forum, and a huge download section.

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264-0335. Because of a local crank caller, new users must call me voice first for a password. My number is (904) 269-5383, 11 a.m.—11 p.m. eastern time.

Wizard Pendleton Orange Park, FL

A TIMELY CORRECTION

Editor:

In reference to my program Appointment Book, which appeared in the November Rainbow. My accompanying article was left out of the magazine, and for those of you who are interested in the program; First, many instructions were in the original article and not present in the write-up. For instance, items can be deleted from the appointment book as they are displayed to the screen (not during input, during display). Pressing D will delete the appropriate item. Second, in response to requests, a newer version displays a calendar graphically on the screen and prints out data one month at a time. Third, copies of the new version with full documentation are available from me at the address 6609 Westmoreland Ave., 20912, for \$9.50, and I am also available to give advice and assistance.

> Bill Bruck Takoma Park, MD

AN EXCEPTIONAL CONTRIBUTION

Editor:

My wife and I have left the ranks of public school teachers to form a private school which is oriented in basic academics and specializing in the exceptional child.

Currently, as we struggle financially to stay in existence, we are using our Personal Color Computer with both gifted and learn-

ing disabled students.

We would be most grateful for any type of hardware or software to be used with our CoCo. We are a not-for-profit corporation and all donations are tax deductible. In addition, we will write all contributors, telling them how their gift will be used with our students. Please send contributions to: Chillicothe Alternative School, Inc., 1515 North Second 61523.

Richard D. Gordley Chillicothe, IL

BOUQUETS AND BRICKBATS

Editor:

I am writing this letter using the VIP Writer and am having a wonderful time doing it. This is an amazing product. However, my real reason for writing this letter is to let your readers know of the company and product that has allowed me to upgrade my CoCo so as to be able to use the Writer to its fullest advantage. I used the Skyline 64K Memory Upgrade Kit to improve my "D" board 16K Extended CoCo to its full potential. Since I get three of the four CoCo oriented magazines and borrow the fourth from a friend, I have seen all of the published 64K upgrade methods. None was as simple as the one provided by Skyline with its memory chips. This upgrade used wirewrapping, not soldering, and required no cutting of capacitors. It

also has chip sockets so that it is removable at will. I am a physician, not an electrician, but still had the upgrade up and running in half an hour and that was only because of my need to undo and fix some of my work while learning from experience.

I hope that passing on my experience can be helpful to others who also wish to upgrade their computers but are afraid to play around in its innards.

Howard A. Glick, MD Leesburg, VA

FAST SERVICE

Editor:

We just got an Olivetti Praxis 41 typewritter/printer. Its Baud rate is 96, and we need to know how to *POKE96* Baud into CoCo's RAM.

I would also like to commend Petrocci Freelance Associates for their fast service. We ordered their *Bowling Secretary* program by mail on a Friday and received the program the following Tuesday.

I would also like to commend the Rainbow on its wonderful service and the Rainbow soundsheet. This just proves that your magazine and the CoCo are the best in their fields.

> Paul Wylie Scottsdale, AZ

Editor:

Last year I took a friend's advice and instead of buying Intellivision for my son's birthday, I bought a Color Computer. He also suggested I subscribe to *the Rainbow*.

As so often stated in your magazine, I received a great deal more than I could have ever imagined in the computer and I can say the same for your magazine. Without your magazine, I would not have access to all the fine programs, knowledge, reviews and information that makes the CoCo the powerful instrument it is.

I have ordered a goodly amount of software from your advertisers, and while I have had my problems (some quite exasperating) I would especially like to commend one that has been of tremendous help to me and has gone far beyond what anyone could expect in the way of service.

The company is Transformation Technologies and I wholeheartedly recommend their programs for those like myself who have absolutely no computer training. With Transformation Technologies' help, I have an up and running word processor, database, mailing list and merger for under \$75.

The ads and prices may be small but the product is big in quality and service. If you are looking for programs that are easy to use, I highly recommend Transformation Technologies.

Jack Thompson Gaithersburg, MD

AN UPLIFTED UPGRADER

Editor.

I recently did the 64K upgrade offered by "Selected Software" on my 16K "F" board. I found it very easy to do and it works perfectly. I'm one of these guys that's all thumbs and my prior electrical experience was re-

pairing electrical cords and the like. I would like to encourage all of your readers to upgrade their CoCos themselves.

F. M. Logullo Hockessin, DE

CLUBS AND MORE CLUBS

Editor:

I would like to inform your readers of the Peoria Color Computer Club for the Color Computer users in Peoria, Ill. and the surrounding area. We meet on the second and fourth Saturdays of each month at 10 a.m. at the Germantown Hills. For further information please contact me at 102 Twin Oaks Ct, 61611 or call (309) 694-4703.

Harold E. Brazee East Peoria, IL

Editor:

I am writing to announce the formation of a new international Adventurer's club for all CoCo users interested in playing or writing adventure programs. Members will maintain contact through a monthly newsletter.

For more information contact me at 84 Camberley Cres., Brampton, L6V 3L4,

phone (416) 451-9452.

Maurice Dow, Ph.D. Ontario, Canada

Editor:

On behalf of other CoCo enthusiasts, I would like to invite groups and individuals, in the U.S. to correspond with fellow users in Australia.

We read with envy each month about the enormous amount of software and hardware available to your readers in the States. By communicating with interested people, we may find ways to overcome some of the problems in getting that great suff out here.

Thus, by creating this "bridge" between our countries, we hope to obtain and exchange information and ideas on the fantas-

tic Color Computer.

Any initial contact can be made c/o Penrith Users Group, 16 Tent St., 2750 N.S.W.

David Cunningham

Kingswood, Australia

Editor:

Anyone in the Athens, Georgia area who is interested in visiting or joining a Color Computer Club, there is a group that meets the first and third Tuesday at 7:30 p.m. in Room 381 of the Science Library at the University of Georgia. If you need more information, write to me at Route 2, Box 165-A, or simply come to the meetings.

Robert Hendrix Watkinsville, GA

Editor:

I would like to announce to all your readers the formation of the Greater Toledo Color Computer Club. The club meets the first Thursday of the month at the Wernert Civic Building on Douglas, north of Laskey, in Toledo. The meeting time is 7:30 p.m. For more information, call 478-6961 or 537-1432.

John Nyitray Sylvania, OH

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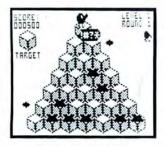




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THE TOP 4 COCO GAMES...

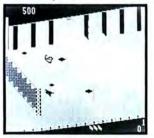


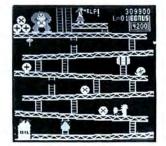
CUBIX

By Spectral Associates. Very much like the arcade smash! Jump little Cubix around the 3D maze trying to change the color of all the squares. With Death Globes, Discs, Snakes, etc. 32K Tape: \$24.95

ZAKSUND

From Elite Software comes this fantastic arcade style space action game with 3 different stages of moving 3-D graphics. You've never seen anything like this on your CoCo! Great sound too! 32K Tape: \$24.95





THE KING

Previously called 'Donkey King', you simply cannot buy a more impressive game for your CoCo. With 4 different screens and loads of fun! From Tom Mix Software. 32K Tape; \$25.95

GHOST GOBBLER

From Spectral Assoc. This "PAC" theme game has been improved several times. It is definitely the best of its type. Brilliant color, action and sound, just like an arcade. 16K Tape: \$24.95



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JOYSTICK INTERFACE/RAPID FIRE/6 FT. EXTENDER ALL IN ONE! The Colorcade allows connection of any Atari type joystick to your CoCo including the Wico Red Ball). These switch type sticks are extremely rugged and have a faster and more positive response. They will improve the play of almost any action game.

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The Colorware Light Pen plugs directly into your joystick port and comes with six fun & useful programs on cassette. Easy instructions show how to use it with Basic and it's compatible with light pen software such as Computer Island's "Fun Pack." Order yours today. Only \$19.95 complete.

TELEWRITER-64

TELEURITER-64

This is an actual unretoxibed referred photo of a black and white screen showing the 51x24 character set that is generated by "Teletext-64". Notice how there is also true lower cases not the reverse were case letters that merely represent lower case characters in other Color Consulter programs.

Telemiter-64 is truly the most nowerful and somhisticated word processor you can but for your Color Computer or IB-100. If you own a printer or are thinking of setting one, you really should not be without this program. Telemiter can be used with amy 16% 32% or 64% system and with any 16% 32% or

ABCBEFGHIJKLMHOPORSTUVUXY Z1234567890|***535*()***[3: abcdefshijklmnop4rstuvuxy DISK \$59.95 CASSETTE . . . \$49.95

Colorware researched the word processors available for the Color Computer. This is the best. Telewriter-64 is a truly sophisticated system that is marvelously easy to use. It works with any 16K, 32K or 64K system and any CoCo compatible printer.

TOP-RATED COCO WORD PROCESSOR





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Making your computer talk couldn't be any easier! 'Real Talker' is a full featured, ready to use, HARDWARE voice synthesizer system in a cartridge pak. It uses the Votrax SC-01 phoneme synthesizer chip to produce a clear, crisp voice.

FREE TEXT-TO-SPEECH

Included free with 'Real Talker' is Colorware's remarkable Text-to-Speech program. This is a truly powerful machine language utility. What it does is automatically convert plain English to speech. And it has an unlimited vocabulary! For example, use it in the direct mode: Type in a sentence or a paragraph, even mix in numbers, dollar signs, etc., then press enter. The text is spoken. At the same time a phoneme string is generated which can be saved to cassette or disk, modified or used in a Basic program.

We originally planned to sell this major piece of programming for about \$40.00 but decided it was so useful that no 'Real Talker' user should be without it. Besides, it really shows off the capability of 'Real Talker'.

Also included with 'Real Talker' is our unique Phoneme Editor program. It allows you to explore and create artificial speech at the phoneme level. Phenomes are the fundimental sounds or building blocks of word pronunciation. There are 64 different phenomes, as well as 4 inflection levels at your disposal. Creating and modifying speech at the phenome level is both fascinating and educational. The Phenome Editor may also be used to customize the pronunciation of speech produced by the Text-to-Speech program.



You don't have to use any of our utility programs though. If you write your own Basic Programs, you will find the pocket sized Votrax Dictionary (included free) is all you need to make your own Basic programs talk. This dictionary gives you quick access to the phenome sequences used to create approximately 1400 of the most used words in the English language.

How about compatibility? 'Real Talker' is compatible with any 16K, 32K, 64K, Extended or non-extended Color Computer. It works with any cassette or disk based system, with or without the Radio Shack Multi-slot expander. No other synthesizer under \$100 can make this claim. Most other CoCo voice synthesizers require an expensive Multi-slot expander in order to work with the disk system. 'Real Talker' requires only an inexpensive Y-adapter. This is an important consideration if you plan on adding a disk or have one already.

YOU DECIDE....

Order yours today on our Toll-Free Order Line. If you are not delighted with your 'Real Talker' system, simply return it within 30 days for a prompt, courteous refund.



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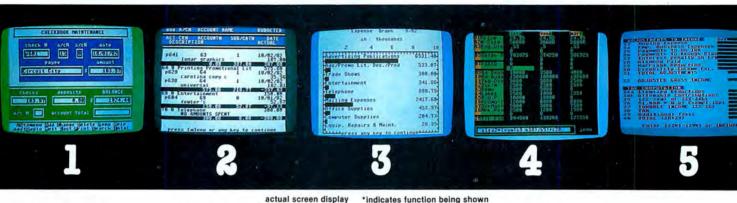


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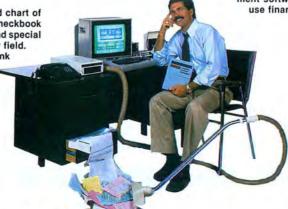
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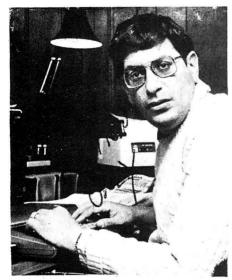
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PRINT #-2,



ell, it is 1984 and we have some really exciting news to kick off the new year. Frankly, the biggest problem that I have is in deciding which of the pieces of news is the *most* exciting. To my mind, the best way to resolve that question is simply to address which of them you will have to make plans for the most — and since one of them will be coming your way no matter what you do, we'll start with the one that requires some action on your part.

What I'm talking about is the second **RAINBOWfest** of the season, to be held in Long Beach, Calif., on Feb. 17-19, 1984. This

promises to be one of the biggest events of the year.

We choose to go to beautiful, sunny Southern California in the dead of winter because we figured it might be just the thing for a mid-winter vacation. And, now here's a bonus! The weekend is the one during which Washington's Birthday will be observed, so that means most of you (and your kids) will have an "extra" day of vacation. It is one of those long weekends the "Monday Holiday" concept has given us.

So, for **RAINBOWfest** — Long Beach, you have an extra day to enjoy the sun and warm weather of Southern California. And

what an opportunity for enjoyment. The Hyatt-Regency Long Beach (our convention hotel, and brand new, I might add) is just 20 minutes away from Disneyland, 20 minutes from Marineland, 25 minutes from Knott's Berry Farm and about 20 minutes from Universal Studios, which has one of the most unique tours I've ever seen. And, a big bonus: The hotel is also just five minutes by water taxi from the Queen Mary, which is moored in Long Beach Harbor. Howard Hughes' "Spruce Goose," the world's largest airplane, is also in the Harbor. And, yes, you can watch the sun set over the balmy blue Pacific right from your hotel room.

What I'm trying to get across is that here is a chance for a really great family vacation. There's a great recreation area right across from the hotel, too, so for the non-computer people in your family, there will be *plenty* to do while the computer people spend time at **RAINBOWfest** itself. There are special room rates at the Hyatt (just mention **RAINBOWfest**) and the hotel is one of the most beautiful we've seen.

More important, there's a lot of talk in the industry about this particular show simply because of the time of the year we're having it. It is a chance for the exhibitors to get away from the cold, too. And early indications are that a lot of people will be taking advantage of that opportunity! So, **RAINBOWfest** in Long Beach promises to be one of the bigger shows we will have this year!

With all the talk of Disneyland, sun, balmy skies and the Queen Mary, let's not forget that we have a

couple of special things lined up that will make this show something extra.

For one thing, we have plans for a couple of programs on Women and Computers — working from both sides of the fence. Plans are for some of the women who are active in the computer industry to be talking about computers and computing. Here is an opportunity for women to meet women who have a common interest in an area which (we believe wrongly) too many seem to take for granted as a "man's world."

But for those of you who are "unreconstructed" and just hate CoCo (what!), another session is planned as well. Here, we're interested in helping you air your gripes about computing with others who have the same ideas. And, while we are billing this as a "woman's" session, men who feel "left out" are cordially invited to attend as well.

Also on the seminar schedule, a special session with Phil Kitchen of Radio Shack. Phil is in charge of the Third Party Software Support program for Tandy and will be meeting with those who are interested in marketing programs. If you've ever thought about selling software, here's a great opportunity to get some inside information and help.

Let's not forget our "CoCo Community Breakfast." Bob Albrecht, one of the foremost authors in the computer world and a *Rainbow* columnist, will be the keynote speaker. Don Inman, one of Bob's cohorts and another columnist, will be giving a seminar on *LOGO* especially aimed at educators and young people. And, we're also trying something new in the seminar field this time: Members of the Dymax Team, working under the name of the "Dragons Of Menlo Park," will be hosting an open-ended seminar on any CoCo topics *you* want to discuss. These, plus a host of other seminars and workshops, add up to a very interesting program in addition to the exhibits.

And speaking of the exhibits, this **RAINBOWfest** comes at the very height of the post-Christmas season. With hundreds of thousands of new CoCos expected to be sold, software and hardware vendors will be introducing a wealth of new merchandise at the show. And remember, one ticket gets you admission to the show floor and all the programs (except the breakfast, which is extra).

And we have two extra-special incentives for you. The first 500 ticket orders will receive a free *Rainbow* poster, a handsome full-color reproduction of our January, 1983, cover. *Plus*, the first five ticket orders from *each state and province* will receive one of our new **RAINBOWfest** tee shirts. This is a special design for the Long Beach show, featuring our logo of a CoCo and a palm tree. And, yes, you can buy others at the show!

Most of all, **RAINBOWfest** will be fun! So, plan to be with us in Long Beach in February. There is a ticket order blank on Page 190 of this issue.

We're just as excited about the second piece of news that we have to announce this month — the inauguration in February of a technical section of *the Rainbow*.

Dale Puckett, our OS-9 columnist, will be one of the featured writers in the new Technical Section, but he will be joined by at least two top-notch people with years of experience in the 6809 field.

One of these new people is Frank Hogg, president of Frank Hogg Laboratory. The other is Paul Searby, owner of Computerware and a long-time dealer, programmer and technical whiz with 6809 systems.

In addition to these new members of the staff, we encourage you to contribute material for the Technical Section, which will be incorporated as a special part of *the Rainbow*. As such, it will be easy to find and will, we believe, provide a wealth of detail and information on more sophisticated uses of the Color Computer and 6809 programming.

I felt extremely fortunate to have Dale join us several months ago and I feel just as proud that Frank and Paul will

POKES, PEEKS & EXECS FILE

Get complete Color Computer power with this exhaustive file containing over 100 pokes, peeks & exec commands with full comments for each. Hi-speed pokes, break disables, list disables and much more! We will even give you a bonus - Tapeto-Disk copy program. All this for only \$5.00 (Postpaid). File on Tape \$7.50, File on Disk \$9.50 (Postpaid).

Recent Supplement to Pokes, Peeks & Execs file with 50 additional pokes, peeks & execs, only \$3.00 (Postpaid).

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A perfect utility to protect your programs with 4 self-executing ML routines to disable list, breakkey, reset and create an error skip routine. 16K Ext. Basic. Cassette \$16.95.

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Transfer most Rompaks to tape or disk. No need to take out the disk controller. 16K or 32K Ext. Basic Cassette \$14.95.

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MICROCOM SOFTWARE P.O. BOX 214 Fairport, NY 14450 (716) 425-1824 be with us beginning next month. You've already read some of the nice things I've had to say about Dale, but let me add that Frank is a unique individual who has provided excellent insight into technical aspects and advanced operating systems of the Coco several years now while Paul has been a part of personal computers from the days you had to build your own — and he did.

You might ask whether we are planning to turn *the Rain-bow* into a high-tech magazine. The answer is no. We will continue to offer a large number of games, hints and tips, practical uses, graphics, utilities and just-for-fun programs as we have done before.

However, we believe there is a growing segment of CoCo owners who want to delve more deeply into programming and some of the technical aspects of the 6809. This natural growth of the market (as evidenced, we believe, by Radio Shack's marketing of OS-9) will be addressed through our new section while not stinting on all the less technical things which have made *the Rainbow* so popular to tens of thousands of you every month.

We're fortunate, I believe, that through our two and a half years of publishing we have had *your* support which has allowed us to grow as large as we are. Because of that, we believe there is *room* to address additional aspects of the CoCo world without taking anything away from what we do now

As always, I look forward to your comments on this move and encourage you to let us know what you think about it.

Finally, one of the questions I get asked the most these days concerns the demise of the Atari and Texas Instruments computers and how I believe they will affect the Color Computer.

You have seen me write several times about my admiration for the people at Radio Shack who do the planning for CoCo and it is significant to me, at any rate, to say that I feel that admiration seems to be hanging out there for all to see in light of the TI and Atari news.

While these two firms are the first victims of the "shakeout" that industry-watchers have been predicting for some time, I think it is instructive to note that Tandy produced a 24 percent *increase* in profit during its last fiscal year. Sure, Tandy sells more than computers, but it is my understanding that computers in general, and CoCo in particular, had a lot to do with that increase.

So, my answer is that I believe the "shakeout" won't do anything but help our favorite computer. When you can buy a computer as complete as CoCo for as little as it sells for today, and get the widest range of additional equipment available on the market at prices as reasonable as they are, you can only expect that the future looks rosy indeed from Tandy Towers.

And that's good for us, too. Because it means that there will be more and more people seeing what so many of us have seen for so long, that we have the best computer available for the best price anywhere. That will only swell our ranks as CoCo owners, bring about even more products and help CoCo expand even more.

Tell a friend about your Color Computer. You'll be doing him or her a *big* favor!

(And while you're at it, tell them about us, too. OK?)

-Lonnie Falk



Telewriter-64 the Color Computer Word Processor

- 3 display formats: 51/64/85 columns × 24 lines
- True lower case characters
- User-friendly full-screen editor
- Right justification
- Easy hyphenation
- Drives any printer
- Embedded format and control codes
- Runs in 16K, 32K, or 64K
- Menu-driven disk and cassette I/O
- No hardware modifications required

THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters*. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

...one of the best programs for the Color Computer I have seen...

- Color Computer News, Jan. 1982

TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

64K COMPATIBLE

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The 51×24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, all on the screen at one time. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dotgraphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette autoretry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

...truly a state of the art word processor...
outstanding in every respect.

— The RAINBOW, Jan. 1982

PROFESSIONAL WORD PROCESSING

You can no longer afford to be without the power and efficiency word processing brings to everything you write. The TRS-80 Color Computer is the lowest priced micro with the capability for serious word processing. And only Telewriter-64 fully unleashes that capability.

Telewriter-64 costs \$49.95 on cassette, \$59.95 on disk, and comes complete with over 70 pages of well-written documentation. (The step-by-step tutorial will have your writing with Telewriter-64 in a matter of minutes.)

To order, send check or money order to:

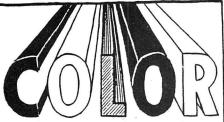
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(Add \$2 for shipping. Californians add 6% state tax. Allow 2 weeks for personal checks. Send self-addressed stamped envelope for Telewriter reviews from CCN, RAINBOW, 80-Micro, 80-U.S. Telewriter owners: send SASE or call for information on upgrading to Telewriter-64. Telewriter-compatible spelling checker (Spell 'n Fix) and Smart Terminal program (Colorcom/E) also available. Call or write for more information.)

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The ultimate Hi-Res Graphics Processor!!! Great for doodling, sketching, and most of all, creating entire graphics screens. Options include; 8 key cursor control with key repeat, Draw command that follows your cursor, FILL command that "PAINTS" the screen with more than 1000 different color/texture combinations, and much much more!!

16/32K cas \$26.95 disk \$28.95.

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RAINBOW

A versatile quiz program. Has study and test formats and allows printing of quiz. Even includes an option for the computer to generate multiple choice answers! cas \$18.95 disk \$20.95

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Got a headache keeping track of merit badges, rank advancements, etc. Compu Scribe keeps tabs on the whole troop and creates printouts by scout, by rank, or alphabetically. Requires a printer with 132 character mode.

Available on disk only - \$26.95.

OKI DUMP

Eight bit screen dump from CoCo to an Okidata printer without dot addressable graphics! Includes hints on printing pictures of game screens, etc. ("The King" by Tom Mix, is the example) a steal at

16K cas \$8.95 16K disk \$10.95



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BUILDING JANUARY'S RAINBOW

Getting Started Special . . . **New Beginnings Edition . . .** And No End In Sight . . .

'elcome to our Beginner's Issue! If you've just purchased a Color Computer, received one for Christmas, or just discovered the Rainbow, I think you'll enjoy this beginner's special. And, if you're one of our regulars, it's an odds-on bet that you'll find something special, too.

You see, in the CoCo Community, we're all beginners of one type or another. Most of us, no matter how long we've been around — and nobody's been around very long in this field — still get a kick out of a short program listing that does something novel. And, regardless of what level of competence we have achieved in personal computing, we all are beginners at something.

Even if you know BASIC as well as the Rainbow's BASIC Guru, Dick White, you'll still learn a trick or two in his "Welcome To BASIC" piece this month. Maybe you know BASIC but are beginning M/L. Many of you have been asking for articles similar to those by Contributing Editor Dennis Lewandowski and Technical Editor Dan Downard to get started in assembly language.

If you're an M/L whiz, how much do you know about the new OS-9? Does the new four-volume documentation for OS-9 looks formidable; Dale Puckett serves up OS-9 in byte-sized chunks.

Game Master Bob Albrecht, has set aside this month to talk about cassette files, offering the sage advice: "You can't record on leader." Hey, somebody's got to tell you the first time. And Dragon Master Bill Nolan has called time out to introduce newcomers to the world of fantasy role playing and to announce a contest.

So you're an old hand at memory upgrades. Well, Tony DiStefano takes a look at upgrading the CoCo 2 — and who isn't a beginner at that?

If your own beginning centers around the MC-10 mini-micro, old hand H. Allen Curtis follows up Bob Russell's CoCo memory map this month with an MC-10 memory map.

A word here about the other side of the Rainbow. If you're just getting to know us, let me remind you about our Rainbow On Tape. The Rainbow is simply too big for you to type in all the program listings we have, so you may want to try our tape cassette "magazine" which has all the longer listings that appear in the Rainbow each month. They're ready to load in and run — saving you hours of typing and debugging — and you may want to begin this service right now, because the price is going up. Check our tear-out reply card for details.

So, whatever you're beginning, there is something for you in this issue of the Rainbow. And, if you've just discovered the Rainbow, there may still be time to begin a subscription before the new rates begin on January 1. Join us, won't you, as we work to make every month of 1984 one of new beginnings:

-Jim Reed

Computerware® Hit Parade...



Poor Jr must overcome four screens to rescue The King from Luigi. Traverse the jungle & swamp, climb vines, avoid vine gators, dodge Zuzu birds, open locks, & conquer Luigi's hideout.

32K C \$28.95 32

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Use speed, skill, & concentration to race your car over the track, dodge competitors, & beat the clock. Taste the road dust, smell burning rubber, feel the press of speed on your chestl

32K C \$21.95

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Big league graphics! Two players against each other or one can practice offense against the computer. 7 defensive & 8 offensive plays plus many formations.

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16K C \$34.95

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A serious health aid for biofeed-back training & a fun family game for "truth detection"! Real silver velcro finger grips attach to the detector box that plugs into the joystick slot. Now watch & listen to the galvanic skin response being graphed on the screen. An impressive experience for a friend who asks "what does your computer do?" All hardware, Bio Feedback program & Anxiety Attack game included. (Results not admissable in courtl) (Req. 16K)

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Travel through different time zones, fending off attacking craft from each period with a full 360 degree firing range. See blimps, helicopters, & all kinds of space vehicles.

32K C \$26.95

32K D \$29.95



He jumps across pyramids of brightly colored cubes, dodges springs & bad eggs, using elevator squares, & gaining points as he clears the cubes towards the next screen

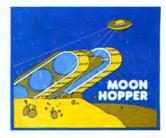
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Flexi Filer

Comprehensive & flexible data base manager. Collect up to 35 fields with up to 240 characters per record using your own names & format. With logical operators select any subset of records using up to 36 different criteria. Sort all or any subset of records in ascending or descending order on any of the 35 fields, with a fast assembly language sort. Design customized labels & reports with automatic page numbers, page headings, & totals of numeric fields.

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Your landing craft rolls over the surface with its tractors, hops over craters & rocks, & phasers attacking aliens to get to home base. Super graphics & sound!

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For programmers who want the speed of assembly language & the ease of BASIC. 48 commands & functions, most a subset of Extended BASIC. Generates position independent code so a compiled program can reside anywhere in memory. When the compiler converts your BASIC program into machine language, it will run an average of 40 times faster!

32K D \$39.95

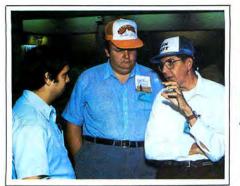


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Authors who want to turn software into cash & see their work on 6809 computers all over the world should apply for our attractive Authorship Programl Add shipping of \$2 surface or \$5 air/Canada. Visa & MasterCard accepted. Dealer inquiries invited. Computerware® is a trademark of Computerware®.



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Tom Nelson of Softlaw listens to a buyer sporting a RAINBOWfest hat.

RAINBOWfest Report



Vern Epps, who came all the way from Canada to Texas to attend RAINBOWfest, stops by the Radio Shack booth to ask some questions about OS-9.



Dennis Lewandowski listens to a question from a RAINBOWfest attendee.



Dave Lagerquist of Chromasette and Silverware explains his tape magazine to a receptive audience.

BOWfest is the people. For the first of the Rainbow's regions shows this year, they came from as close as Fort Worth itself and as far away a Canada and California—all looking to sample a big helping of "CoCo Community" at the Hyatt-Regency For Worth.

The city's mayor was there to preser publisher Lonnie Falk with a proclamation that it was, indeed, "Color Computer Weekend" in Fort Worth, "a division of Tandy Corp." CoCo celebritie abounded and thousands of users sper up to three days viewing exhibits, a tending seminars and meeting all thos people who were just names on magazine pages or voices on the telephone.



No one can ever say there isn't a lot of variety at RAINBOWfest, as the Endicott Software booth attests.

Although attendance wasn't as large as the first RAINBOWfest in Chicago last spring (4,100 compared to better than 10,000), the CoCo world was out in force and everyone had a grand time. The smaller crowds made it easier for everyone to get additional information about products and programs on display.

Talk of the show was OS-9, Radio Shack's new multi-user, multi-tasking operating system. In fact, Tandy sold every single copy of OS-9 that was to be found in the Fort Worth area and orders were taken by both Radio Shack and Jack Torres of Computer Plus for many, many more.

New games from a number of vendors, new utilities from others and some spiffy new business programs dominated interest. And, for many, it was a first chance to see products they had been considering. Some early Christmas shopping was very much in order.

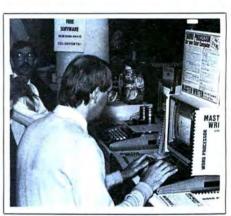
The seminar sessions were a big hit. Frank Hogg ventured out of his laboratory and attracted a bring-extra-chairs-from-down-the-hall, standing-room-only crowd to his talk on advanced operating systems. Steve Blyn waded ashore from Computer Island to talk about educational programming and was the object of turn-about that would have made any kid's heart glad: Signing attendance notes for teachers to take back to school with them.

Yes, the graphics master, Don Inman, was on the program, too, as were program authors John Gabbard (Keys to the Wizard and Android Attack) and Tim Purves (Fury) of Spectral Asso-

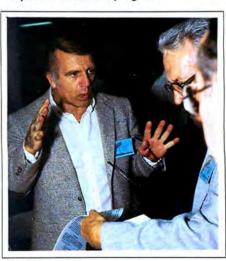
Who else but Bob Rosen of Spectrum Projects would have one of those power microphones that also plays more than 100 ear-shattering tunes? And who else but *Rainbow's* Jim Reed would try to play them all? Would Bob (Captain Eighty) Liddil lose all his magic powers if he took off his trusty leather hat? Where else could you get 64K chips for \$39.95 and have them installed while-you-wait? Or log on to CompuServe for free as Sandy Trevor and Bill Louden watched?



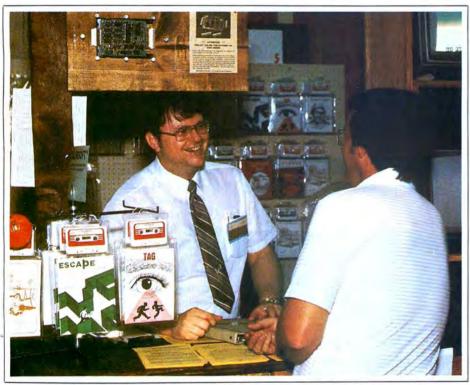
The game was the thing at the Computer Shack booth.



Mike Anderson of Pyramid edits copy while Armadillo Software's Jerry Alexander explains his monitor program.



Ron Krebs of Mark Data Products explains his new graphic Adventure games.



Frank Brandon of Brantex set up his own "Texas Store" to explain his new business program packages.

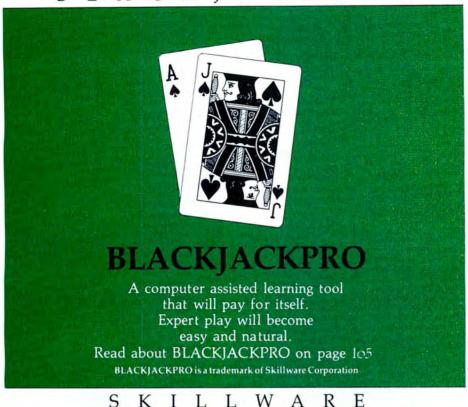


Games and utilities were a big hit at the show.



Jack Torres of Computer Plus demonstrates a printer to a group of buyers.

BLACKIACKPRO





Radio Shack's Mark Yamagata is awarded a plaque by Rainbow publisher Lonnie Falk for being keynote speaker at the CoCo Community Breakfast Saturday.



Playing a Tom Mix Software game was one of the highlights of the show.



At RAINBOWfest, you didn't need Bob Hope to say "Thanks For The Memories."

ciates and Computer Shack.

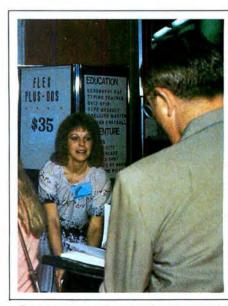
Frank Brandon and Dennis Mitchel of Brandtex were there to talk abou business systems; Dungeon Master Bil Nolan of Prickly-Pear was on hand Tom Nelson of Softlaw and Andy Lar son of Follett Library Book Company were also part of the learning sessions.

But best of all, RAINBOWfest goers were able to learn something about everyone. For instance, Tom Nelson has a master's degree in Chinese—no wonder he's so good at writing documentation for brother Dan's machine languag programs.

You may know that Andy Larson was instrumental in getting Learning Company software for the CoCo, but were you aware that he designed and built his own house (as did Sue and Pau Searby of Computerware) and that he likes to hang by his feet in the hallway for relaxation?

Yes. Contrary to what you mighthink, everyone in the CoCo world doesn't spend all his time in front of a monitor screen. On the other hand there's Steve Bjork. On a side trip to Billy Bob's, billed as the world's larges honky tonk, Steve was seen pouring quarters into an arcade game whill most everyone else was whooping it up to Tanya Tucker.

Speaking of trips, the tour of the CoCo plant—the first time an outside group has ever been allowed into Tandy's manufacturing facilities—was voted by all as a major highlight of the week end. And, when RAINBOWfest goer were not computer-watching, they were people-watching.



Spectral Associates' Cindy Shackleford explains how FLEX+DOS works to a RAINBOWfest-goer.

As in Chicago, the "CoCo Community Breakfast" was a sellout, this time to hear Radio Shack's new director of computer merchandising for personal computer products, Mark Yamagata, give some excellent insight into the future of Tandy marketing and advertising efforts. In fact, Tandy-ites were out in force. *Microcomputer News* editor Bruce Elliott even won a door prize.

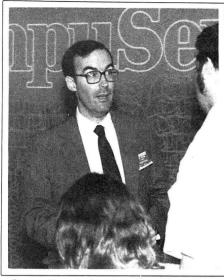
RAINBOWfest in Tandy town. Down the street from One Tandy Center and a short bus ride from Kenji Nishikawa's plant tour. Ed Juge, director of computer merchandising for business products. joined us for breakfast as did Barry Thompson, CoCo Line Manager; Bill Walters, who manages the Model 100 products; Roy Irvine, who handles all the peripherals; Phil Kitchens, who is in charge of third party support and Bill Gattis, VP in charge of the Education Division. A whole host of others, from publicity, advertising, technical support, software buying and quality control were in attendance, too.

John Ross brought The Answer and Ron and Don Garrett added an International (Color Computer Club) flavor. John and Linda Nielson had MOR Eton business programs while John Waclo of Elite Software, Joe Bennett of JARB, Cindy Shackleford of Spectral and Bill Ginn of Computer House added to the fun. We were pleased to welcome some other magazines as exhibitors, too. The Wayne Green (Hot CoCo) crowd was there as was the Tennessee Gentleman, Larry Williams of 68 Micro Journal and Color Micro Journal.

Others brought others. Dennis Lewandowski brought his father while Rosie stayed home. But Giesel Mix, Sara Nolan, Margaret Preble and Mona Krebs brought their husbands Tom, Bill, Larry and Ron.

Yes, most of all it was fun. And, while there were fewer people at Fort Worth than had been at Chicago, we expect that the concept of Regional RAIN-BOWfests might have had something to do with that. We'll see you all—and many of you again in Long Beach, Calif., February 17-19; New Brunswick, N.J., March 30-April 1; and Chicago June 22-24!

A good time was had by all. And more good times are coming!



CompuServe's Sandy Trevor direct connects with a user.



Ed Juge of Radio Shack and Frank Hogg share some thoughts at the CoCo Community Breakfast.



Just about everyone had a good time at RAINBOWfest.



Andy Larson of Follett Library Book Company talks about educational software at one of the seminar sessions.



VDOS attracts a crowd at Dr. Larry Preble's booth.

Cookies and CoCo:

The Tandy Home Computers Tour

By Jim Reed Rainbow Managing Editor



Each assembler handles one part to stuff on each board during a given cycle, a unique system here in the U.S.

s we began the descent into the Dallas-Fort Worth airport, I hoped the flight was on schedule and that the airport limo wouldn't be late—otherwise, I might miss the bus. And, I didn't want to miss this bus; I might not get another chance if I didn't go early to beat the crowd.

I was making a pilgrimage of sorts; I was bound and determined—bound for the source and determined to see this Adventure through.

The Fort Worth RAINBOW fest provided a unique opportunity in that Tandy arranged a special open house at Tandy Home Computers just for the occasion. This I wanted to see!

No, they weren't handing out free chips, but Tandy did provide coffee, cola and cookies as busload after busload arrived at CoCo's birthplace to see the facility. All day Friday and Saturday, groups left the Hyatt Regency, downtown, at 45-minute intervals for the short ride out to Northway Drive where CoCos were being produced at the rate of one every five seconds.

Texas hospitality was at its finest as

the management staff at Tandy Home Computers laid out the red carpet to RAINBOWfest attendees. Kenji Nishikawa, the general manager, greeted us in the cafeteria and even came along as we broke into smaller groups and toured the plant. Afterwards, he and other top management people were on hand to answer our questions.

The tour itself lasted perhaps 30 minutes—which, like Baby Bear's porridge, was "just right"—and took us step by step from incoming Quality Control assembly to shipping.

With the predominance of white—white walls, white packing and white CoCos—along with much stainless steel and conveyor belts throughout the facility, it felt a bit like touring a big doughnut bakery.

The main manufacturing area, which consists of sub-assembly to final assembly, Quality Control, Quality Assurance, and on to shipping, is a remarkably quiet place, considering all the activity going on. The pace is an unhurried, but steady beat.

Our tour guides told us that the



General Manager Kenji Nishikawa took a very active role in the tour.

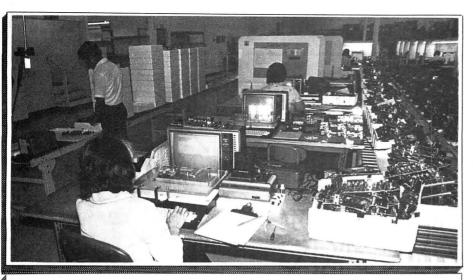
printed circuit boards are auto-stuffed at Tandy Instruments, a sister division, and then delivered to any of three carousel lines. Workers on these three lines stuff all components in the P. C. board—capacitors, sockets, I. C.'s, etc., prior to wave soldering.

According to Tandy, the One Piece Insertion Assembly Technique is unique to the United States. It surprised many of us to observe that each assembler only handles one part to stuff on each board until all boards are stuffed and complete one cycle, whereupon the assemblers then start on the next component. Much more hand work than you might have anticipated.

After all components are inserted by the stuffing department, each logic board is fed into the wave solder machine.



THC's employees on the assembly line. There are 600 employees.



Amazingly, 1.7 million transistors function at first power up.

First, the board passes across the flux in order to prepare for better solder activation, then the machine solders eveything n one, 700-degree pass. Radio Shack's CoCo operation solders at a rate of 5,000 logic boards daily.

After soldering, the board is put hrough a water base washing process to remove the flux. Interestingly, a commercial dishwasher has been modified pecifically for board washing. The boards are then air dried and sent to the ead trim process where blades operating at speeds of 4,000 RPM add a finishing touch by clipping off any excess wire.

After clock frequency adjustment, he first diagnostic test station is Functional Test. In this stage, the logic board first comes to life and is treated as an independent computer by using its own nemory to store diagnostic software—hen CoCo diagnoses itself!

Amazingly, 1.7 million transistors function at the first power up. Some 20 functions are tested and, provided CoCo passes, it's then on to burn-in.

In a brief visit to the burn-in department, we learned that this is probably the most important step in maintaining the highest reliability of the product. This process is to weed out all "infant mortality" of the semi-conductor in the integrated circuit. Even though all of Tandy's semi-conductor suppliers have a similar piece by piece burn-in process in their manufacturing, the CoCo plant repeats the process at the computer manufacturing level.

All sub-assembled, functionally tested P.C. boards are loaded into one of 10 oven chambers for pre-burn-in and then the actual burn-in. During burn-in, boards are kept at both high and low temperatures for 20 hours. After completion of burn-in, every logic board is

carefully diagnosed while still heated. We were told that statistics indicate an expected life span of 11 years for the semi-conductors after these conditions in burn-in.

In final assembly, workers combine the logic board, keyboard and power supply and place them inside the case. At this point, each unit is carefully tested for dielectric leakage.

In Quality Control, we are told that the management philosophy is "Do it right the first time," that is, quality cannot be added in Quality Control, but must be installed in the production process. By the time each CoCo reaches this point, it has gone through diagnostic/functional tests 13 times and has passed 25 detailed inspection gates. But there's more.

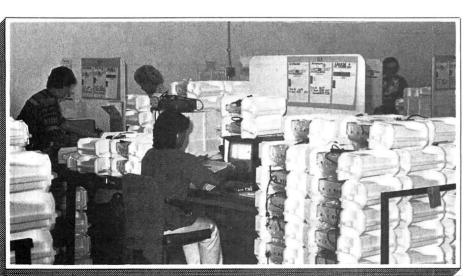


Each CoCo goes through 13 tests and inspections before packing.

Prior to packing and shipping, the Quality Assurance department audits on a random sample basis and measures against the Radio Shack acceptance criteria. Because of these many checkpoints, the return ratio of defective units from the field is said to be negligible.

Our last tour stop, naturally enough, was packing and shipping. Packing up Color Computers at a rate of 12 per minute, this department loads the finished product into empty trailers for distribution to Radio Shack warehouses in the U.S., Canada and overseas.

The Tandy Home Computers tour: a RAINBOW fest highlight for all of us who attended, a chance to see what goes inside the Color Computer without even voiding the warranty—a peek and poke Adventure in real time, and real life.



In Quality Assurance, work is audited on a random sample basis and measured against Radio Shack acceptance criteria.

16K ECB





By David C. Wilson

suppose that all of us have wondered what goes on in an artist's mind when he creates a piece of modern art. Well, I've found out how they do it. They all own a Color Computer and use this little program.

The program generates random lines, boxes, triangles, and circles or elipses. Sometimes they are painted and sometimes not. Each time the program is started (after the first few seconds) it generates a new work of (whew!) art. Also, the music will make a few music masters roll over in their graves.

But, it's fun to watch, and it made my kids giggle a bit listening to it. So sit back, relax, and enjoy a little of what

goes on in the mind of a genius.

The listing:

10 PCLEAR8

20 PCLS

30 G=255:H=191

40 A=RND(G):B=RND(G):C=RND(G):D=

RND(H):E=RND(H):F=RND(H)

50 L=RND(1):CO=RND(8):CL=RND(8):

COL=RND(8):P=RND(4)
60 PMODEP,L:SCREEN1,CO

(David Wilson is a sheet metal worker and computer hobbyist in Louisville, Ky. He is very interested in computers in education.)

70 COLORCO,CL

80 LINE(A,D)-(B,F),PSET,B

90 SOUNDA, 1

100 COLORCL,CO

110 LINE(C,F)-(A,D),PSET:LINE-(B

.E).PSET:LINE-(C,F),PSET

120 IFP=2THEN230

130 SOUNDB, 1

140 A=RND(A): D=RND(D)

150 CIRCLE(A,E),D,COL,CO/3

160 IFP>OTHENPAINT(A,E),P+1,COL

170 SOUNDC, 1

180 IFP=1THEN200

190 IFP=3THEN200ELSE220

200 LINE(B,F)-(C,D),PSET,BF:GOTO

270

210 SOUNDD, 1

220 LINE(B,F)-(C,D), PSET: GOTO260

230 SOUNDE, 1

240 PCOPY(COL)TO(CL)

250 G0T030

260 FORG=1TO(A)STEP20:SOUNDG,1:N

EXT: GOTO280

270 FORG=(C)TO1STEP-20:SOUNDG,1:

NEXT

280 GOTO30

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120.....00FA

END ... 020B

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Max Jerman

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Over 250 disks containing more than 1200 lessons for grades K-9 in reading, spelling, language arts, math, problem solving, math games, reading games, and programs for young learners are included in the plan.

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THE BENEFITS—Consortium schools will automatically receive updates and new program releases at no increase in membership fee. There will be no shortage of quality software for the most popular computers.

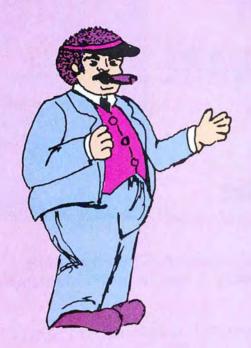
THE COST—Only \$250 per school per year. There is an additional start-up cost of \$250 per school to cover initial expenses. Licenses for specific computers are available to large consortia or states at reduced cost.

BERTAMAX INC. Max Jerman, Ph.D., President



ACT NOW—Form your own consortium and contact us. Contact us directly for the names of interested schools in your area.

At Last—A Software Solution



Hi, There! I'm Your Friendly Acey Deucey Dealer

By Barry R. Furman

Acey Deucey is a card game I programmed for the 16K Color Computer without Extended BASIC. It uses the SET, CHR\$, and SOUND commands generously.

A unique part of the game is the talking Acey Deucey dealer. The starting graphics showing the dealer is right from Radio Shack's "Getting Started With Color BASIC." (Remember, "Talking Teacher"?)

Since the dealer talks, it's necessary for you to record his repertoire on the tape immediately following the CSAVE.

First, CSAVE "ACEYDUCY."

Next, place a microphone in the recorder's MIC receptacle (or use condensor mike if included).

Third, type MOTORON and press [ENTER].

Immediately, narrate the following to be recorded on the tape:

HI, THERE! I'M YOUR FRIENDLY ACEY DEUCEY DEALER! ACEY DEUCEY IS PLAYED IN THE FOLLOWING MANNER . . . I WILL DEAL TWO CARDS FACE UP. YOU HAVE THE OPTION TO BET OR NOT TO BET, DEPENDING ON WHETHER OR NOT YOU FEEL THE NEXT CARD WILL HAVE A VALUE BETWEEN THE FIRST TWO CARDS. IF YOU DON'T WANT TO BET, JUST INPUT A ZERO. WHY DON'T YOU PRESS THE LETTER 'C' FOR 'CHICKEN' TO HEAR THE NOISE YOU'RE GOING TO HEAR . . .

(FIVE SECOND PAUSE)

NOW, IF YOU'RE GOING TO WIN THE ROUND, AND I CERTAINLY DOUBT IT, YOU'LL HEAR THIS NOISE ... PRESS 'W' FOR 'WIN' ...

(Barry Furman is a banking assistant vice president who writes programs on his CoCo as a hobby. He plans to start his own software business.)

(FIVE-SECOND PAUSE)

IF YOU LOSE, AND I CERTAINLY HOPE YOU DO, YOU'LL HEAR THIS NOISE . . . JUST PRESS 'L' FOR 'LOSE' . . .

(FIVE SECOND PAUSE)

OKAY, NOW WE'RE READY TO PLAY THE GAME. CHECK HOW MUCH MONEY YOU HAVE IN YOUR WALLET OR PURSE, AND PLUG IT IN. JUST PRESS 'B' TO BEGIN AND ENTER THE AMOUNT...

(THREE-SECOND PAUSE)

SO, YOU WANT TO PLAY ANOTHER GAME AAINST ME, HUH? OK, YOU KNOW WHAT TO DO. JUST PRESS 'B' TO BEGIN AND ENTER HOW MUCH MONEY YOU WANT TO START WITH.

(THREE-SECOND PAUSE)

SO, YOU LOST AGAIN, HUH?... AND YOU STILL WANT TO PLAY A THIRD GAME! WELL, OK. JUST PRESS 'B' AND THE AMOUNT OF MONEY YOU WANT TO PLAY WITH.

(THREE SECOND PAUSE)

HEY, I'VE BEATEN YOU THREE TIMES ALREADY! DO YOU STILL WANT TO PLAY? WELL, IF YOU DO, JUST PRESS 'B' AND THEN ENTER THE AMOUNT OF MONEY YOU WANT TO PLAY WITH.

(THREE SECOND PAUSE)

NOW LOOK, I'M GETTING TIRED! THIS IS THE LAST GAME I'M GOING TO PROMPT YOU ON... SO PRESS 'B' AND THE AMOUNT OF MONEY, BUT I'M WARNING YOU... NEXT TIME IF YOU WANT TO PLAY, YOU'RE GOING TO HAVE A SILENT PARTNER. JUST KEEP REMEMBERING TO PRESS 'B.'

When finished, rewind the tape and CLOAD the program. The Acey Deucey dealer appears, and the tape recorder plays back his voice. It is imperative that you keep the casssette recorder's [PLAY] key depressed throughout the game. After giving you instructions, the dealer asks you to press "B" to begin and enter your amount of money.

The screen changes to the card table showing three cards face down and your pack of money (with its value). The screen says: "Here's the shuffle," and then you'll hear a card-shuffling sound. Two of the three cards "turn over" to show their faces. The suits of these cards will always be club and spade, but the number values change. (In Color BASIC graphics, it was not possible to make red suits on the buff (white) card face without introducing black in the design. This is because a single quarter of a SET mark cannot be independently lit.)

The card values are determined randomly, but for simplicity, I designed it so the first card would always have the lower value of the two, and the two cards would not have the same value, or succeeding values. In a game using actual cards, this would not be the case.

The idea of the game is to bet (whatever amount you want) that the value of the still unturned card falls between the two cards showing. (You may bet up to the value of your current pack of "dough".)

The third card now turns over, showing its face value. The screen also indicates whether you won, lost, bet zero ("chicken!"), bet too much, or lost all your money. Accompanying this will be an appropriate sound. The value of your pack of money is updated accordingly.

If you lose your money, and answer "Y" to the "Play again?" prompt, you'll again be facing the dealer who will have another conversation with you.

The dealer is drawn in Lines 80-390. The POKE 65495,0 in Line 70 is used to speed up the graphics and accompanying sound. If your computer won't accept this poke, delete that line.

The body of the program (Lines 400-1710) concern the choosing of random numbers, and printing of text on the screen.

The card backs are drawn in Lines 1800-2130. They are turned over in Lines 2140-2410. The third (dealer's) card is turned over in Lines 2420-2770.

Anyone who wishes a copy of this program on tape may send \$5 to Barry Furman, 21 Sunset Lane, Levittown, N.Y. 11756. I'll also include an *enhanced* version of Radio Shack's *Blackjack* program listed in "Getting Started With Color BASIC"

	1		all I	
1	190	. 0193	1530	OAEA
				0D17
	790	. 0604	2100	0F45
	1210	.08A6	2480	1187
			END	1336

The listing:

- 10 'acey ducy 20 'BY BARRY FURMAN 30 '21 SUNSET LANE 40 'LEVITTOWN, N.Y. 11756
- 50 'TEL: (516) 796-5040
- 70 POKE65495,0
- 80 CLSO: N=100: A=0: B=0: C=0: D=0: E= 0: G=0: H=0: I=0: J=0: K=0: L=0: M=0: D=
- 0:P=0:Q=0:R=0:S=0:T=0:U=0:V=0:W=
- 0: X=0: Y=0: Z=0
- 90 FORH=16T047
- 100 FORV=4T023
- 110 SET (H, V, 2)
- 120 NEXTV. H
- 130 FORH=OTO63STEP4
- 140 FORV=24T031
- 150 SET (H, V, 8) : SET (H+1, V, 8)
- 160 SET (H+2, V, 7): SET (H+3, V, 7)
- 170 NEXTV.H
- 180 FORH=26T035
- 190 FORV=16TO21
- 200 SET (H, V, 4)
- 200 SETTH, V, 47
- 210 NEXTV, H
- 220 FORV=10T011
- 230 SET (24, V, 3): SET (25, V, 3)
- 240 SET (36, V, 3): SET (37, V, 3)
- 250 NEXTV
- 260 PRINT@5, "THE ACEY-DUCEY DEAL ER";
- 270 IFF>4THENPRINT@304, "REMEMBER ...";:PRINT@338, "PRESS 'B' ";
- 280 IFF>4THEN300
- 290 MOTORON: AUDIOON
- 300 D\$=INKEY\$
- 310 IFO\$="W"THENMOTOROFF:GOSUB26
- 320 IFO\$="L"THENMOTOROFF: GOSUB27
- 00
- 330 IFO*="C"THENMOTOROFF:GOSUB27
- 340 IFO\$="B"THENMOTOROFF
- 350 IFO\$="B"THENF=F+1
- 360 IFO\$=""THEN400
- 370 IFO\$="B"THENPRINT@480, "HOW M
- UCH MONEY DO YOU HAVE";: INPUTQ
- 380 IFQ>OTHENMOTOROFF: GOTO430
- 390 IFO\$="B"ANDQ=OTHENMOTOROFF:G 0TO430
- 400 RESET (30, 18): RESET (30, 19)
- 410 IFRND(4)=4THENSET(24,10,2):S
- ET (37, 10, 2)
- 420 GOTO180
- 430 N=100

```
440 CLSO
                                        960 NEXTX
450 IFQ=OTHENQ=100
                                        970 FORX=437T0447
460 K=K+1: IFK<>1THEN540
                                        980 PRINT@X, CHR$ (128);
470 PRINT@224, "YOU ARE STARTING
                                        990 NEXTX
WITH"Q"BUCKS";:GOTO590
                                        1000 GDTD660
                                        1010 IF M <= Q THEN 1140
480 FORX=64T095
                                        1020 T=339:PRINT@T, "SORRY BUT YO
490 PRINT@X, CHR$ (128);
500 NEXTX
                                        U";:PRINT@T+32, "BET TOO MUCH ";
                                        1030 PRINT@T+64, "YOU HAVE ONLY";
510 FORX=64T095
                                        :PRINT@T+96,Q"DOLLARS ";:PRINT@T
520 PRINT@X, CHR$(128);
                                        +131, "TO BET.";
530 NEXTX
                                        1040 PRINT@T+161," BET AGAIN ";
540 FORX=64T095:PRINT@X.CHR$(128
                                        1050 FORD=1T01750
);:NEXTX:PRINT@68,"YOU NOW HAVE"
Q"DOLLARS.";
                                        1060 NEXTD
                                        1070 FORX=299T0319
550 PRINT@459, "$"; :PRINT@460, Q;
560 FORX=1T01100
                                        1080 PRINT@X, CHR$(128);:NEXTX
                                        1090 FORG=39TO63
570 NEXTX
580 IFK<>1THEN610
                                        1100 FORJ=18TO31
                                       1110 RESET(G,J)
590 \text{ FOR J} = 1 \text{ TO } 900
600 NEXTJ
                                       1120 NEXTJ,G
610 GOT0660
                                        1130 GOTO860
                                       1140 C=RND(13)
620 Q=Q+M
                                        1150 RESTORE
630 GOT0460
                                        1160 READG
640 Q=Q-M
650 GOT0460
                                        1170 IFG=14THEN960
                                       1180 READC$
660 L=L+1: IFL>1THENN$="NEXT"ELSE
                                        1190 IF G = C THEN D$ = C$
N#="FIRST": GOSUB1690
670 IFL>1THENPRINT@16, "NEXT TWO
                                        1200 GOSUB2420
                                        1210 GOTO1220
CARDS: ";
680 A=RND(13)
                                        1220 IF C > A THEN 1240
690 B=RND(13)
                                        1230 GOTO1410
                                       1240 IF C >= B THEN 1410
700 IF A >= B THEN 680
                                       1250 FORY=1T08
710 IFB-A=1THEN680
720 GOTO740
                                        1260 PRINT@405, "YOU WIN!!!";
730 GOT0640
                                        1270 SOUND225,5
740 RESTORE
                                        1280 PRINT@405, CHR$ (128); :PRINT@
750 DATA1, A, 2, 2, 3, 3, 4, 4, 5, 5, 6, 6,
                                        406, CHR$ (128); :PRINT@407, CHR$ (12
7,7,8,8,9,9,10,10,11,J,12,Q,13,K
                                        8);:PRINT@408,CHR$(128);:PRINT@4
, 14
                                        09, CHR$ (128); :PRINT@410, CHR$ (128
                                        );:PRINT@411,CHR$(128);:PRINT@41
760 READG: IFG=14THEN800
770 READC$
                                        2, CHR$ (128);
780 IF A = G THEN L$ = C$
                                        1290 PRINT@413, CHR$(128); :PRINT@
790 GOT0760
                                        414, CHR$ (128);
800 RESTORE
                                       1300 NEXTY
810 READ G: IFG=14THEN850
                                       1310 FORP=300T0319
820 READC$
                                       1320 PRINT@P, CHR$(128);
830 IF G = B THEN V$ = C$
                                       1330 NEXTP
840 GOTO810
                                       1340 FORZ=288T0319
850 GOSUB1800
                                       1350 PRINT@Z, CHR$ (128);
860 GOTO870
                                       1360 NEXTZ
870 PRINT@288, "WHAT IS YOUR BET"
                                       1370 FORX=405TO415
;: INPUTM
                                       1380 PRINT@X,CHR$(128);
880 FORX=310T0319
                                       1390 NEXTX
890 PRINT@X, CHR$ (128);
                                       1400 GOT0620
900 NEXTX
                                       1410 PRINT@438, "SORRY, ";:PRINT@4
910 IFM<>OTHEN1010
                                      69,"YOU LOSE!";
920 PRINT@437, "CHICKEN!!!";
                                     1420 SOUND13,17
930 SOUND21,8:SOUND16,18
                                       1430 FORX=1T01010
940 FORX=288T0319
                                       1440 NEXTX
950 PRINT@X, CHR$(128);
                                        1450 FORY=288T0319
```

28

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1460 PRINT@Y, CHR\$ (128); 1470 NEXTY 1480 FORX=438T0447 1490 PRINT@X, CHR\$(128); 1500 PRINT@X+30, CHR\$(128); 1510 NEXTX 1520 IF M < Q THEN640 1530 PRINT 1540 V=307: PRINT@V, "SORRY FRIEND , ";:PRINT@V+34, "YOU LOST";:PRINT @V+65, "YOUR DOUGH"; 1550 PRINT@436, "WANT TO TRY"; :PR INT@468, "AGAIN(Y/N)"; : PRINT@505, "";: INPUTA\$ 1560 FORX=478T0483 1570 PRINT@X, CHR\$ (128); 1580 NEXTX 1590 IFA\$="Y"THEN80 1600 PRINT@484, "O.K. HOPE YOU H AD FUN!!"; 1610 FORX=508T0510 1620 PRINT@X, CHR\$ (128); 1630 NEXTX 1640 GOTO1640 1650 CLSO 1660 FORH=11T021 1670 FORV=5T013 1680 SET (H, V, 5) 1690 CLSO:PRINT@2, "HERE ARE YOUR

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"N\$" TWO CARDS"; 1700 PRINT@288, "NEXT CARD"; 1710 '***GREEN PILE OF DOUGH*** 1720 PRINT@361, "YOUR DOUGH"; 1730 FORX=425T0434 1740 PRINT@X, CHR\$(143+80); 1750 PRINT@X+32, CHR\$(143+80); 1760 PRINT@X+64, CHR\$ (143+80); 1770 NEXTX 1780 PRINT@459, "\$"; :PRINT@460, Q; 1790 RETURN 1800 '*****BACK OF CARD****** 1810 FORX=64T096 1820 PRINT@X, CHR\$ (128); 1830 NEXTX 1840 FORH=10T021 1850 FORV=7TO15 1860 PRINT@288, "NEXT CARD"; 1870 PRINT@69, "HERE'S THE SHUFFL E. . . "; 1880 SET (H, V, 4) 1890 SET(10, V, 5): SET(21, V, 5) 1900 SET (H+32, V+1, 4) 1910 **** 1920 SET (H-6, V+15, 4) 1930 SET(42,V+1,5):SET(52,V+1,5) 1940 0=0+1 1950 **** 1960 SET(4,V+15,5):SET(14,V+15,5) 1970 NEXTV, H 1980 PP=PP+1: IFPP>20THEN2010 1990 SOUND190+PP.1 2000 GOT01980 2010 PP=0:FORX=101T0106 2020 PRINT@X, CHR\$ (131+64); 2030 **** 2040 PRINT@X+221, CHR\$(131+64); 2050 PRINT@X+160, CHR\$(140+64); 2060 **** 2070 PRINT@X+381, CHR\$(140+64); 2080 PRINT@X+16, CHR\$ (131+64); 2090 PRINT@X+176, CHR\$ (140+64); 2100 **** 2110 NEXTX 2120 FORT=1T01500 2130 NEXTT 2140 FORH=12TO21 2150 FORV=6T013 2160 PRINT@65, "NOW I'LL TURN THE CARDS OVER..."; 2170 SET(H, V+2, 5): SET(H+32, V+2, 5 2180 NEXTV 2190 NEXTH 2200 FORV=7T012 2210 SET(11, V, 5) 2220 SET(21,V,5) **2230 NEXTV** 2240 PRINT@200, CHR\$ (132+64);

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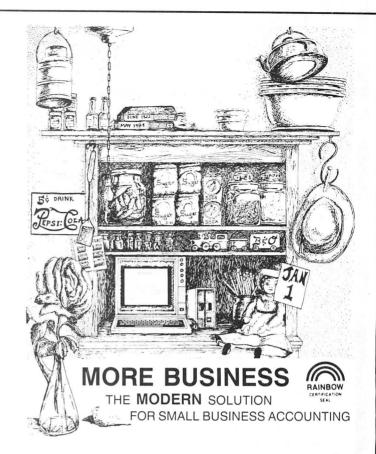
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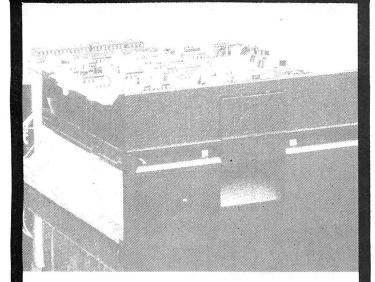
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2250 PRINT@199, CHR$(142+64);
2260 PRINT@232, CHR$ (135+64);
2270 PRINT@215, CHR$ (128);
2280 PRINT@216, CHR$(128);
2290 PRINT@217, CHR$ (133+64);
2300 PRINT@248, CHR$ (135+64);
2310 PRINT@184, CHR$ (140+64);
2320 PRINT@183,CHR$(142+64);
2330 PRINT@134,L$;
2340 SOUND90,2
2350 FORJ=1T01000
2360 NEXTJ
2370 PRINT@150, V$;
2380 SOUND110,1
2390 FORX=1T01600
2400 NEXTX
2410 RETURN
2420 '**TURN OVER DEALER'S CARD*
2430 FORX=1T01000
2440 NEXTX
2450 FORH=4T014
2460 FORV=23T030
2470 SET(H,V,5)
2480 NEXTV.H
2490 PRINT@420, CHR$ (128);
2500 PRINT@421, CHR$ (128);
2510 PRINT@422,CHR$(133+64);
2520 PRINT@388,CHR$(142+64);
2530 PRINT@389,CHR$(140+64);
2540 PRINT@453, CHR$ (135+64);
2550 RESTORE
2560 READG
2570 IFG=14THEN2610
2580 READC$
2590 IF G = C THEN D$ = C$
2600 GDTD2560
2610 FORX=1T0300
2620 NEXTX
2630 PRINT@355, D$;
2640 RETURN
2650 GOTO2650
2660 FORX=1TO4
2670 SOUND 225,5
2680 NEXTX
2690 RETURN
2700 FORX=1T08
2710 NEXTX
2720 SOUND13,17
2730 RETURN
2740 FORX=1TO8
2750 NEXTX
2760 SOUND21,8:SOUND16,18
2770 RETURN
2780 *********
2790 LINEINPUTA$
2800 PRINT#-2,A$
2810 A$=INKEY$:IFA$=""THEN2810EL
SEMOTOROFF: GOTO2790
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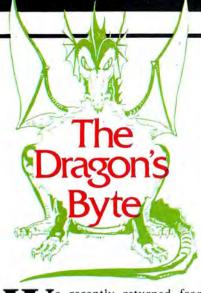
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The Benefits Of Role Playing Are No Fantasy

By Bill Nolan
Rainbow Contributing Editor

Worth, Texas, and all of the computer users I spoke with really enjoyed the show. While there, I had the privilege of doing a seminar on the uses of a computer for fantasy gaming, and from the questions and comments I received I think many fantasy game players may be receiving criticism from several quarters concerning their play of the game.

With that in mind, I would like to talk about fantasy gaming, and particularly the benefits of fantasy gaming. Fantasy games are role playing games. In these games the participants act out the roles of one or more characters in an effort to solve various problems or mysteries. In order to play these games properly, all of the people involved must exercise a great deal of imagination and ingenuity, and this increased imagination is sure to carry over into other areas of life.

Some say that the imagination is being used to escape from reality, and I cannot disagree with this. However, I would like to point out that we are escaping from our reality every time we watch a drama or comedy on television, and every time we sit down to read a good novel. The essence of the writer's art is to be able to take the reader or watcher out of themselves for a while and allow them to identify with a different reality. When you finish your book, you can return to your everyday reality refreshed and with a new perspective.

In addition to this, fantasy role playing is not a passive activity, like reading a book or watching a television drama. The participants are creating the story as they go along. It's kind of like deciding you want to read a book—and then writing one so you have one to read.

Another nice thing is the difference between fantasy role playing games and most other games. Nearly all games (whether they are card games like hearts, poker, and old maid; board games like Monopoly, Clue, or Scrabble; computer games like Viking! or Gangbusters; or athletic games like tennis and football) are contests in which players compete against each other. At the end of the game there will be one person or team which wins, and one or several who lose. The lesson of these games is clear: to get ahead you must beat somebody else. To win you must take victory away

(Bill Nolan teaches computer science at a local college, referees a weekly fantasy game, and operates Prickly-Pear Software with his wife, Sara.)



In fantasy role playing games, however, you have a group of players working together toward a common goal. In nearly all cases, you must help your friends to win in order to win yourself, because, in most cases, the entire party of players will win or lose together. The spirit of cooperation fostered by this cannot fail to make the point that in real life it works the same way. If we all pull together toward a common goal, we can all win, but if we work at cross purposes we may all lose.

Aside from these philosophical considerations, there are many practical skills gained while playing fantasy games. First of all, there are many complex records to be maintained, and this skill can be used whenever records are needed. Second, money is always a problem in the game, as in real life, and a player must carefully budget the limited funds so as to cover all expenses. Also, the game will usually involve planning for trips and other operations spanning long periods of time, and supplies such as food must be planned in advance. How much food will you eat in the next month? How will you carry it? If you put it on a pack horse, then how much will the pack horse eat? You get the idea.

The educators I have spoken with tell me that, in most cases, the young people interested in fantasy gaming are among the brightest and best students. They are also far more likely to be interested in computers, and not just so they can play Adventure in Wonderland. They really use the electronic whiz boxes. So, the next time someone gets on your case for wasting your time playing fantasy games, whip out this article and lay it on 'em!

Remember our contest? Last month a contest was announced with two categories. You may remember that we are designing a new fantasy gaming system in this column. and the contest is to design either an original spell or an original monster for the new game. First place in each category will win a \$50 gift certificate from Prickly-Pear Software and a \$50 gift certificate from Sahuaro Software. Second place in each category will win a \$50 gift certificate from Prickly-Pear Software. In addition, each person submitting an entry used in the column will receive a four-color screened Prickly-Pear dragon T-shirt worth \$9.95. All entries should be sent to Contest, c/o Bill Nolan, 9234 E. 30th Street, Tucson, Az., 85710. All entries must be received by January 20, 1984, to be eligible, and winners will be announced in the April issue of Rainbow. All entries become the property of Bill Nolan.

Signature



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TIME BANDIT

by Bill Dunlevy

FANTASTIC ADVENTURES AND UN-LIMITED RICHES ABOUND WHEN ONE TRAVELS THROUGH TIME — YOU ARE THE TIME BANDIT!

Thanks to Bill Dunlevy and Harry Lafnear, you can transform your Color Computer into the ultimate arcade experience. 32K has never looked or played better!

Tired of games that have only a few screens or force you to follow a strict order of levels? In TIME BANDIT, you virtually create you own game! You can choose from more than TWENTY places during the entire game, and each place has more than 15 distinct



FANTASY WORLD: Conquer the halls of Doom, the Mystic Maze, the Underworld Arena, and other medieval places.

MUDPIES

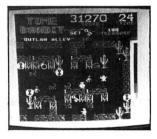
by Jeff Sorenson & Philip McKenzie

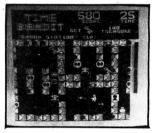
THE KID IS IN TROUBLE!!! Arnold went to see the circus. It was great! Full of acrobats, animals, side show acts, and as always... CLOWNS! The kid is surrounded by clowns, and picking up some Mudpies he starts throwing them at the clowns. But the clowns get mad and start throwing things back at Arnold! Can you help Arnold make it to safety? As you avoid the mad clowns, throwing mudpies at them, you might make it to the exit.. only to find more rooms filled with more clowns. Will Arnold ever make it home?

Mudpies is great, it is totally random with many different screens, it will be different every time you play. Guaranteed hours and hours of fun.

Tape...... 27.95 Disk...... 29.95

WESTERN WORLD: Visit the Lost Maverick Mine, Dead Man's Pass, (Visit? Escape!) Tombstone Jail, and many more!





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variations and levels of difficulty; this means over 300 variations in all! You can use the TIMEGATES to travel to three different Worlds of Time, each one containing a multitude of colorful and unique adventuring areas. Visit FANTASY WORLD, WESTERN WORLD, or SPACE WORLD. Avoid or destroy the Evil Guardians: the Watching Lurker, Angry Elmo, Killer Smurphs, and lots more! Find the keys which remove various locks preventing your escape. But hurry Bandit—your power is dwindling and time is fleeting! This new machine language game is so exciting, challenging, and fun that you need never leave your home to find an arcade again! Ultra crisp Supergraphics that include colorful scrolling landscapes and full animation of a multitude of characters, amazing sound, and literally HUNDREDS of screens - it's all here! The conquest of time and space awaits you...



STRONGHOLD

The war was short! Missles were launched, bombs exploded, and civilization was almost entirely whiped out. Only a handful of men remained to help rebuild what was lost. These handful seperated into four different civilizations, each building their own city and shielding it from the radioactive debris that fill the atmosphere. Now the debris has threatened to break up the shielding and destroy civilizations last remainents.

One or two player action with sound and split second graphics. Thats STRONGHOLD, try it and you'll enjoy it!





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For spells you should specify the name of the spell, materials and time needed to cast it, range, area or number of people affected, effect of the spell, whether saving throws are allow, and what happens if the saving throw is made.

For monsters we need a complete description with a sketch if possible, and the usual stats such as speed, size, attack method, number of attacks, intelligence, special attacks or defenses, and the damage multiplier. As you will recall, the damage multiplier is used to compute damage on our new computer combat system, and for reference a fist is .5 and a long sword is 1.

For both the spells and monsters, the more detailed and original your entry, the better your chance to win. Yes, you can enter in both categories, and yes, more than one entry per category is permitted.

The program I am presenting this month is by popular demand. Several months ago, I did a column about how to do maps of various rooms on the screen in Hi-Res graphics, so when the players enter a room, all you have to do is press the correct number and the appropriate room map is displayed on the screen. I included a few rooms to get you started and suggested that you could put 99 rooms into the program easily in a 16K machine. Well, a lot of people thought I must have already done this and have written asking me to publish all 99 of my rooms, so here they

The way you use the program is simple. After typing it in (or loading Rainbow on Tape), you can select the room you want by typing the number. You must always type a two digit number, so you would type a 7 as "07." When you type the number, the room map will appear on the screen. The first thing you should do is go through the program looking at each room and drawing a map of it with its number indicated. Then you can create dungeons, castles, towers, and other structures using the rooms from the program. Simply indicate on your dungeon map or key what the program room number is, and you will be able to call it up whenever the players enter the room.

That way, instead of wasting valuable game time describing a complex room, the players will see a map right on the TV screen. Don't limit yourself by assuming that north is always at the top, either. You can simply say "north is at the left" or whatever and use each room in four different orientations. By combining these rooms in various ways, you can create thousands of different maps.

MichTron is our new corporate identity. Computer Shack is being sued by Tandy. Tandy has a trademark on the words "The Shack" and they say that, Computer Shack cannot use the word Shack in its name. The way it looks right now is that Computer Shack simply doesn't have enough money to defend itself against the Tandy Corporation, and will have to change it's name.



Since Computer Shack is getting an excellent reputation for fast delivery and excellent quality software for the Color Computer we decided to form a new company to market Computer Shacks COCO software. MichTron is it. Computer Shack will continue to publish software for the Model I/III/4.

Sometimes being an independent dealer has its advantages. We look at all the programs on the market and after talking to many people we pick the best. We at MichTron feel the TELEWRITER 64 is the best word processor, ELITE CALC is the best Calc sheet, and Spectrum's COLOR COM E is the best smart terminal. Therefore this is what we carry and recommend. We want nothing but the best for our customers.



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TOP TEN FOR THE MONTH OF DECEMBER

#1 CASHMAN Computer Shack

A great original game for the COCO! A combination of Jumpman and Bagman with many totally original concepts specially designed for the COCO. Excellent one player game. Unbelievably fun to play with 2 players simultaneously. TAPE/DISK\$27.95/29.95

#2 DEMON SEED Comp Shack

Somewhat like the game Phoenix. 3 different waves of demons and bats attack you. Plus you have challenge rounds! Great graphics and fast action.

TAPE/DISK.....(27.95/29.95)

#3 TIME BANDIT Comp Shack

Another game written for the COCO this is an original game. The closest arcade game is Tutenkham to which it has a very loose resemblance. Great color and super fun to play. (\$27.95/29.95)

4 LUNAR PATROL Spectral

This is an exact copy of the arcade game Moon Patrol. Excellent graphics.

TAPE/DISK......\$24.95/28.95)

5 LANCER

This is a copy of the arcade game Joust. Excellent graphics and playability. TAPE/DISK (\$24.95/28.95) Computer Shack

A very loose copy of the arcade game Time Pilot. Excellent color, very fast. TAPE/DISK \$27.95/29.95

7 OUTHOUSE **Computer Shack**

A totally new outrageously funny game only available on the COCO.

TAPE/DISK \$27.95/29.95

#8 CHOPPER STRIKE

A combination of Scramble, Whirlybird Run and Chopper. Great action and graphics.

TAPE/DISK \$27.95/29.95

#9 THE KING Tom Mix

A copy of the arcade game Donkey Kong. Very good graphics. (\$26.95/29.95)

10 MUDPIES **Computer Shack**

An original game by the authors of Demon Seed. Excellent graphics and its super fun to play. One of our favorites!

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ASSEMBLY LANGUAGE GRAPHICS FOR THE TRS-80 COLOR COMPUTER

By Don Inman \$14.95
Written specifically for the TRS-80 Color Computer, this book uses sound and graphics to show how 6809 assembly language can be used to perform tasks that would be difficult or impossible with BASIC. All of the explanations are hands-on, so that the manual can serve as a tutorial

PROGRAMMING THE 6809

By Zaks & Labiak \$14.95
This book explains how to program the 6809 in assembly language, covering all aspects progressively and systematically. Begining with the basics of programming, Programming the 6809 goes on to explain registers and buses, subroutines, the 6809 instruction set, addressing modes, I/O techniques and devices, and finally, data structures.

THE FACTS

By Spectral Associates \$14.95
The facts is a compendium of data designed to explain in detail the internal workings of the Color Computer. A must for any machine language or basic programmer.

TRS-80 COLOR COMPUTER GRAPHICS

By Don Inman \$14.95
Explore the creative and imaginative blending of computers and color using Color Computer Graphics. This book will enable you to explore all the graphics capabilities of Extended Basic. The book also provides application programs and useful subroutines. 303 pages.

PASCAL · A Problem Solving Approach

By Elliot Koffman \$14.95 Here is everything you need to know about problem solving and structured programming in Pascal.

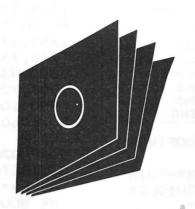
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By Rodney Zaks \$14.95
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C III

This program lets you copy a Color Computer disk file (any file: basic, text or machine language) to a Model I/III or 4 disk or from a Model I/III or 4 to a Color Computer disk. This program does no conversions but it will transfer any file to or from a disk. You must have a Model I/III or 4 with 2 disk drives (Model I must be double density). Compatible with most Model I/III operating systems.

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SUPERZAP has a main screen menu that tells you all the options and their corresponding keys. All you do is decide what you need done and the program does the rest. Disk backups, copy sectors, erase tracks, granule maps, kill and list files, modify sectors in HEX or ASCII, and more! No more lost time because of disk problems. SUPERZAP can do it! The ultimate in disk repair and information retieval. No

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without it.

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Next month we will get back to the new game, so keep those entries coming in, and watch out for dragons!

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20 U\$="L1U10R3D10L2BU10":R\$="U1R
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D10":L\$="D2L10U3R10D1BL10"
30 C183:PRINT@88 "HIT THE DESIDE

30 CLS3:PRINT@98,"HIT THE DESIRE D ROOM NUMBER";:PRINT@165,"(FROM '01' TO '99')";

40 X\$=INKEY\$:IF X\$="" THEN GOTO4 0 ELSE SOUND150,1

50 XX\$=INKEY\$:IF XX\$="" THEN GOT O50 ELSE X\$=X\$+XX\$:SOUND150,1 60 X=VAL(X\$):GOSUB90:IF X>50 THE

N X=X-50:GOTO80
70 ON X GOSUB110,120,130,140,150

,160,170,180,190,200,210,220,230 ,240,250,260,270,280,290,300,310

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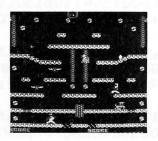
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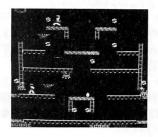
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CASHMAN

By Doug Frayer and Bill Dunlevy



The screen is exploding with colorful, fast moving animation like you've never seen. The speaker is alive with every kink of sound imaginable! Best of all, the players eyes are glowing with fascination and wonder of this classic creation. THE GAME??? CASHMAN! So colorful, so imaginative, so all out fun, that you'll wonder why you ever settled for anything less!.



Dozens of levels and screens (more than FORTY!) let anyone from beginner to expert have as much excitement, challenge, and good clean fun as they can stand! Even the least adept player can have the time of their life with CASHMAN, yet with the increased excitement of special MYSTERY PIECES and EXPERT PUZZLE screens, the most experienced arcade addict is guaranteed to never stop playing!!!

Play by yourself or invite the ultimate hallenge of simultaneous two player competition! Run along the colorful girders, jump across the tremendous chasms, climb the wobbly ladders, or grab a BYRD and fly to get the loot before your opponent does! Be careful though, KATS are on the prowl and wrestling with them can be a challenge.



CASHMAN's classical play is the originality and the fun that no arcader whether a veteran or a rookie can afford to pass up. So run, jump, climb, or fly to the nearest color computer and play the ultimate. . . . CASHMAN!

32K COLOR COMPUTER TAPE..... \$27.95 DISK..... \$29.95

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L5":PAINT(131,91),8,6:GOTO100 290 DRAW"BM60,100U20R30XR*;R30D1 0R50D10L70XL*;XL*;L30":PAINT(62, 97),7,6:GOTO100

300 DRAW"BM60,100U90R30XR\$;XR\$;R 70D90L120":CIRCLE(130,60),35:PAI NT(62,98),8,6:PAINT(130,60),7,6: GDTD100

310 DRAW"BM128,96D10L10NU10L4NU1 OL4NU10L4NU10L4NU10L4U10NR20U10R 10U20XR\$;D20BL10XR\$;R10D10XL\$;": GDT0100

320 DRAW"BM60,100U10NU30R10U30L1 0U10R40ND50R5ND50R5ND50R5ND50R5N D50R5ND50R5ND50R120D20XD\$;D20L55 XL\$;L25XL\$;XL\$;L80":PAINT(62,98) ,7,6:PAINT(62,80),8,6:PAINT(160,62),7,6:GOTO100

330 DRAW"BM128,96U20XU\$;U20R50D5 0L20XL\$;L20":PAINT(130,90),8,6:G DTD100

340 DRAW"BM60,140U10XU\$;U10R50U6 ORBOD10XD\$;D10L50D60L80":PAINT(6 5,135),7,6:GDT0100

350 DRAW"BM128,96U70R25XR\$;R25D7 0L25XL\$:L25":PAINT(130,90),7,6:G 0T0100

360 DRAW"BM128,96U70R40XR\$;R20D7 0L70":PAINT(130,90),8,6:GDT0100

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380 DRAW"BM40,160U150R110D150L50 XL\$; L50": PAINT(128,96),8,6:GOTO1

390 DRAW"BM128,96L5ND10L5ND10L5N D10L5ND10L5ND10L5ND10XL*;BD10NR4 OU15XU*;U5R10XR*;XR*;R10D5XD*;D1 5":GOT0100

400 DRAW"BM60,130U12OR15XR\$;R15D 90R50D70XL\$;U60L50D20L30":PAINT(62,110),7,6:GDTD100

410 DRAW"BM60,120U95R70XR*;D95L8
0U10R70U70L40NL30BD10L20D50R50U5
0L30BD10L10D30R30U30L20BD10D10R1
0U10L10":PAINT(62,118),8,6:PAINT
(62,102),6,6:PAINT(72,93),7,6:PA
INT(82,82),6,6:PAINT(92,72),7,6:
GDT0100

420 DRAW"BM128,96U6OR4OD2OXD\$;D3
OL40":PAINT(130,90),8,6:GOT0100
430 DRAW"BM128,96U35XU\$;U35R4OD8
OL15XL\$;L15":PAINT(130,90),8,6:G
OT0100

440 DRAW"BM128,96U2OR30U2OR50D60 L50U2OL30":PAINT(130,90),7,6:GOT D100

450 DRAW"BM128,96U55R30D20R50XR\$;D35L90":PAINT(130,90),8,6:GOTO1

460 DRAW"BM128,96U25XU\$;U25R25XR \$;R25D25XD\$;D25L60":PAINT(130,90),8,6:GOTO100

470 DRAW"BM88,156U100R100D40XD\$; D50L100":PAINT(94,146),7,6:GDTD1

480 DRAW"BM100,120U60R60D60L25XL \$;L25":PAINT(112,110),7,6:GOT010 0

490 DRAW"BM60,96U5OR100D100L50U1 0XU\$;U30L50":PAINT(63,92),8,6:8D TD100

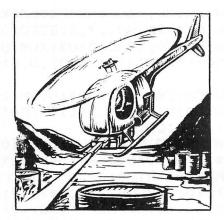
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510 DRAW"BM60,150XU\$;U90R50D50R5 0U20XU\$;U1XU\$;U9R50D100L150U1":P AINT(67,140),8,6:GDTD100

520 DRAW"BM120,96U10BU10U10R30D2 0XD\$;D10L40U10L20U20R30":PAINT(1 27,90),8,6:GDTD100

530 DRAW"BM100,116U20XU\$;U20R10X R\$;R10XR\$;R10D10XD\$;D10XD\$;D10L1 0XL\$;L10XL\$;L10":PAINT(102,113), 7,6:GDTD100

540 DRAW"BM100,96U20XU\$;U10R10XR \$;R10D10XD\$;D20R10D10L20XL\$;L10U 10":PAINT(102,90),8,6:GUTD100 550 DRAW"BM128,96U20R5XR\$;R5D20L

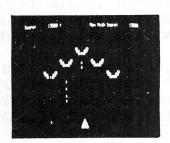


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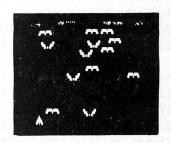
The patter of the blades, the roar of the engine, and the scream of the wind against the glass can be heard as you slowly move your chopper toward enemy terrain. Your mission — SEARCH AND DESTROY. Find enemy outpost, missle site, gun turrets, and oil tanks and then, using your own guns, destroy them. Help to rescue your own men, trapped behind enemy lines. Most of all, SURVIVE against fantastic odds.

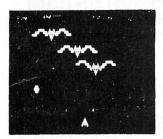
Below are your targets! Look over there! An enemy oil tank, filled with fuel. Take the chopper low, watch your gun sights, as the tank comes into view, FIRE! In a blaze of color, the tank errupts upon the screen! But watch out, right over the cliff is an enamy gun turret just waiting for you to pass. Jam the stick inot the upper corner and avoid its deadly barrage. Line it up in your gun sights and return the blast. Got it! But next time will you be so lucky? Ground missles, ICBM's, and unstopable heat seeker's are just a few of the obstacles you'll encounter. Survival won't be easy, but then, nothing worth while ever is!

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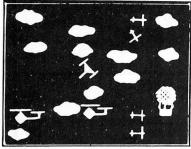




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OXL\$;L10H30":PAINT(122,90),7,6:G

600 DRAW"BM120,96U10R30H10L10U5R 40D20XD\$;D5L50XU\$;":PAINT(122,93),8,6:GOTO100

610 DRAW"BM120,96U10XU\$;U10R20F2 OR10XR\$;D10L60":PAINT(122,90),7, 6:G0T0100

620 DRAW"BM110,148U45XU\$;U45E3OR 10XR\$;D12OR10F10L70":PAINT(112,5 0),7,6:GOT0100

630 DRAW"BM130,120U25XU\$;XU\$;U25 G36F35":PAINT(128,116),8,6:GOT01

640 DRAW"BM110,96U15XU\$;U15R6OD1 OXD\$;D2OL60":PAINT(112,90),7,6:G DTD100

650 DRAW"BM120,96U10XU\$;U30F60L2 5XL\$;L25U10":PAINT(122,90),8,6:G 660 DRAW"BM120,96U50R20F50L30XL\$
;L30":PAINT(122,90),7,6:GOT0100
670 DRAW"BM120,120U15XU\$;XU\$;U15
R50D50L50":PAINT(126,118),8,6:GO
T0100

680 DRAW"BM128,96U10XU\$;U10R10XR \$;R10D10XD\$;D10L10XL\$;L10":PAINT (135,92),7,6:GOTD100

690 DRAW"BM128,96U2OXU\$;U2OR1OXR \$;R1OXR\$;R1OD39XD\$;XD\$;D4OL8OXL\$;L1OU6OR1OXR\$;R1OD1OR2O":CIRCLE(153,121),15:CIRCLE(153,71),15:CI RCLE(103,121),15:PAINT(135,90),8 ,6:PAINT(153,121),7,6:PAINT(153, 71),7,6:PAINT(103,121),7,6:GOTO1

700 DRAW"BM128,96U75R30D150L30U6
5L10D50L10XL\$;L10U90R10XR\$;R10D3
0R10":PAINT(135,90),8,6:GDT0100
710 DRAW"BM128,96U30XR\$;R20D40XL
\$;U10L20":PAINT(135,90),7,6:GOT0
100

720 DRAW"BM60,100U50R100D40XD\$; X D\$; D40L100U50":FORB=70T0150STEP2 O:FOR C=140T060STEP-20:CIRCLE(B, C),5:NEXT C:NEXT B:PAINT(65,95), 8,6:GOT0100

730 DRAW"BM60,146U50XU\$; XU\$; U40R 30U20R10XR\$; R10D50R30U20R10XR\$; R

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740 DRAW"BM60, 96U3OR10U3OF5OR2OU 40R60D80L25XL\$; L25U3OL5XL\$; L5D40 L6OU10XU\$; U2O": CIRCLE(88, 96), 10, 6,2:PAINT(88, 96), 7,6:PAINT(63, 96), 8,6:GOTO100

750 DRAW"BM118,106U3OR10XR\$;R10D 30L10XL\$;L10":PAINT(124,96),7,6: GOT0100

760 DRAW"BM108,116U15XU\$;U15R15X R\$;R15D15XD\$;D15L15XL\$;L15":PAIN T(112,106),8,6:GOTO100

770 DRAW"BM108,116U40R15XR\$;R15D 40L15XL\$;L15":PAINT(112,106),7,6 :GDTU100

780 DRAW"BM108,116U15XU\$;U15R40D 40L40":PAINT(112,106),8,6:GOTO10 0

790 DRAW"BM100,120U50R20XR\$;R20D 50L20XL\$;L20":PAINT(110,110),7,6 :GOTO100

800 DRAW"BM100,120U50R50D50L20XL \$;L20":PAINT(110,110),8,6:GOT010 0

810 CIRCLE(128,96),15:DRAW"BM123,110XR\$;":PAINT(128,96),7,6:GOTO

820 CIRCLE(128,96),50:DRAW"BM123,145XR\$;":PAINT(128,96),8,6:GOTO 100

830 CIRCLE(128,96),30:DRAW"BM123,125XR\$;":PAINT(128,96),7,6:GOTO

840 CIRCLE(128,96),25:CIRCLE(128,96),50:DRAW"BM123,145XR\$;":PAIN T(128,96),7,6:PAINT(128,140),8,6:GOTO100

850 DRAW"BM80,110U10XU\$;U10E30R1 0XR\$;R10F30D10XD\$;D10G30L10XL\$;L 10H30":PAINT(128,96),7,6:GOTO100 860 DRAW"BM80,110U10XU\$;U10E30R3 0F30D30G30L30H30":PAINT(128,96), 8,6:GOTO100

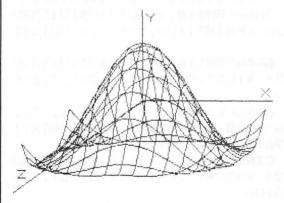
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880 DRAW"BM128,140H30U10XU\$;U10E 30F30D10XD\$;D10G30":PAINT(128,96),8,6:GOTD100

890 DRAW"BM80,146U45XU\$;U45R100D 45XD\$;D45L40XL\$;XL\$;L40":PAINT(1 28,96),7,6:GOTO100

900 DRAW"BM50, 180U20NR160U20NR16 0U20NR160U20NR160U20NR16 0U20NR160U20R20ND160R20ND160R20N D160R10XR\$; ND160XR\$; R10ND160R20N D160R20ND160R20D160L70XL\$; XL\$; L7

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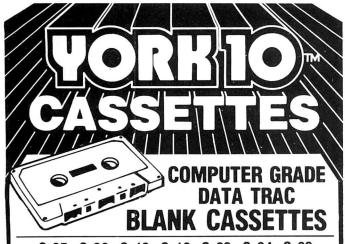




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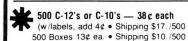
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				Disk? (y/n)
Somputer in	iane a mode			DISK: (y/II)

O":FOR X=60T0180STEP40:FOR Y=30T 0150STEP40:PAINT(X,Y),8,6:NEXT Y :NEXT X

910 FOR X=80T0200STEP40:FOR Y=50 TO170STEP40: PAINT(X,Y),8,6:NEXT Y:NEXT X:FOR X=60T0180STEP40:FOR Y=50T0170STEP40:PAINT(X,Y),7,6:N EXT Y:NEXT X:FOR X=80T0200STEP40 :FOR Y=30T0150STEP40:PAINT(X,Y), 7,6:NEXT Y:NEXT X:GOTO100

920 DRAW"BM90,140U55XU\$;U55F12OL 55XL\$;L55":PAINT(110,100),7,6:GO T0100

930 DRAW"BM128,96H3OR6OF3OL25XL\$;L25":PAINT(132,92),8,6:GOTO100 940 DRAW"BM90,120E60R35XR\$;R35G6 OL35XL\$;L35":PAINT(128,96),8,6:G OT0100

950 DRAW"BM60,120E60R55XR\$;R55G6 OL55XL\$;L55":PAINT(128,96),7,6:G OT0100

960 DRAW"BM70,120E40R60F40L60XL\$;XL\$;L60":PAINT(128,96),8,6:GOTO 100

970 DRAW"BM30,120E70R20XR\$;R20F7 OL190":PAINT(128,96),7,6:GDT0100 980 DRAW"BM80,116E40R5XR\$;R5F40L 100":PAINT(128,96),8,6:GOTO100 990 DRAW"BM128,96U30R20D30L5XL\$; L5":PAINT(131,92),7,6:GOTO100 1000 DRAW"BM128, 96U10XU\$; U10R20D 30L20":PAINT(131,92),8,6:GOTO100 1010 DRAW"BM118,116U40R20D40L5XL \$;L5":PAINT(128,96),8,6:GOTO100 1020 DRAW"BM118,116U15XU\$;U15R20 D40L20":PAINT(128,96),7,6:GOTO10

1030 DRAW"BM118, 116U15XU\$; U15R20 D40L5XL\$;L5":PAINT(128,96),7,6:G OT0100

1040 CIRCLE(128,120),50,6,1,.5,1 :DRAW"BM78, 120R45XR\$; R45":PAINT (128,96),8,6:GOTO100

1050 CIRCLE(128,96),70,6,.5:DRAW "BM123,60XR\$; ": PAINT (128,96),7,6 :GOT0100

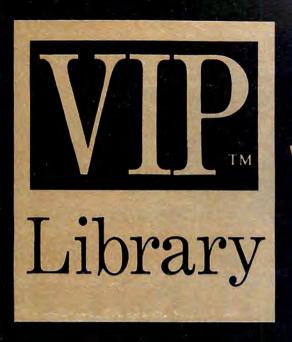
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1070 DRAW"BM128, 96U5XU\$; U15F30L3 O":PAINT(131,93),7,6:GOTO100

1080 DRAW"BM90,116U15XU\$;U15R40F 40L35XL\$;L35":PAINT(128,96),8,6: GOT0100

1090 DRAW"BM90,76U5XU\$;U5R80D80L 5XL\$;L5U60L60":PAINT(98,70),7,6:

1100 DRAW"BM70, 60R10XR\$; R10F30E3 OR10XR\$; R10G60H60": PAINT (80,65). 8,6:GOT0100



ANNOUNCING The VIP Library™ With a Terrific Sale!

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All Library programs are written in machine code specifically for the Color Computer, to work without the interference of a separate operating system such as FLEX. From this comes speed and more workspace for you. Library programs work perfectly with every Color Computer, from 16 to 64K. The most advanced hardware and software techniques are used to place programs in rompak cartridges for instant loading and total workspace with any Color Computer.

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The programs do not depend on BASIC, and so allow total compatibility and workspace with any size Color Computer, even 64K. Unlike other programs for the Color Computer which are said to be 64K compatible, VIP Library programs are not limited to between 24 and 30K of workspace in 64K. Library programs have Memory Sense with BANK SWITCHING to fully use all 64K, thus giving an astounding 61K of workspace with the rompak cartridge, and up to 51K with a disk version!

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For your writing needs is the VIP Writer™, and its spelling checker, the VIP Speller™. For financial planning and mathematical calculations you can use the VIP Calc™. To manage your information and send multiple mailings there is the VIP Database™. For sending all these files to and from home or the office and for talking to your friends you can have the VIP Terminal™. Finally, to fix disks to keep all your Library files in good repair we offer the VIP Disk-ZAP™.

Mini Disk Operating System

The Disk versions each have a Mini Disk Operating System which will masterfully handle from 1 to 4 drives. It offers smooth operation for such features as the ability to read a directory, display free space on the disk, kill files, save and automatically verify files, and load, rename and append files. **Library** programs simply do not have the limitations of BASIC.

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The **Library** comes handsomely bound in gold-embossed, padded leatherette binders to grace your work area with the professionalism it deserves. Welcome the **VIP Library™** into your home and office.

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By Tim Nelson

RATED TOPS IN RAINBOW, HOT COCO, COLOR COMPUTER MAGAZINE AND BASIC COMPUTING The Official Dragon Microcomputer Word Processort

The most powerful and easy-to-use word processor is available in , the showpiece and workhorse of the Library: The VIP Writer". Because of its undisputed superiority over all Color Computer word processors, it was selected by Dragon Data Ltd. of England to be the Official Word Processor for its line of Dragon microcomputers.

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". . . Nearly every feature and option possible to implement on the Color Computer. The design of the program is excellent; the programming is flawless . . . Features for the professional, yet it is easy enough for newcomers to master . . . Certainly one of the best word processors available for any computer . . ." October 1983 "Rainbow"

The Writer will work with you and your printer to do things you always wanted to do. Every feature of your printer can be put to use, every character set, every graphics capability at any baud rate, EVEN PROPORTIONAL SPACING. All this with simplicity and elegance.

Although all versions feature tape save and load, the disk version provides the Mini Disk Operating System common to the whole Library, plus disk file linking for continous printing.

Professional features of particular note:

- Memory-Sense with BANK SWITCHING to fully utilize 64K, giving not just 24 or 30K, but up to 61K of workspace with the rompak version and 50K with the disk version.
- TRUE FORMAT WINDOW to EXACTLY replicate the printed page. ON THE SCREEN BEFORE PRINTING, showing centered line headers, FOOTNOTES, page breaks, page numbers, & margins in line lengths of up to 240 characters. It makes HYPHENATION a snap.
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 The ability to control ANY PRINTER, using dynamic text formatting with 27 comprehensive format parameters.
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Spelling checkers are an invaluable aid to every writer. Habitual misspellings and typos can be found without the eyestrain, boredom and fatigue associated with endless proofreading. The VIP Speller™ is a fast, machine-code proofreading program to correct any VIP Library[™] or other ASCII file. It automatically proofreads your documents against a 20,000 word stock dictionary, plus your own customized dictionary and corrects typos or marks them for special attention.

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Lowercase displays not available with this program.



(Formerly Super "Color" Calc) TRUE VISICALCT POWER! By Kevin Herrboldt

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* Typeahead * Print up to 255 cloumn worksheet * Prints at any baud
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Fully Compatible With CoCo 2

THE FINEST TERMINAL PROGRAM ANYWHERE!

By Dan Nelson

From your home or office you can join the communication revolution. The **VIP Terminal** opens the world to you. You can monitor your investments with the Dow Jones Information Service, or broaden your horizons with The Source or Compuserve, bulletin boards, other computers, even the mainframe at work.

Picture getting your instantaneous investment report, incorporating it in your spreadsheet calculation, generating a report, and writing a memo incorporating that report and data from your database, all with Library programs. Then you can transmit the report to work, or wherever, long distance. The VIP Terminal¹¹ will become the hub of your Library.

FEATURES: Memory-Sense with BANK SWITCHING for full use of workspace, from 16 to 64K * Selectively print data at baud rates from 110 to 9600 * Full 128 character ASCII keyboard * Automatic graphic mode * Word mode (word wrap) for unbroken words * Send and receive Library files, Machine Lanuage & BASIC programs * Set communications baud rate from 110 to 9600, Duplex: Half/Full/Echo, Word length: 7 or 8, Parity: Odd/Even or None, Stop Bits: 1-9 * Local linefeeds to screen * Save and load ASCII files, Machine Code & BASIC programs * Lowercase masking * 10 Keystroke Multiplier (MACRO) buffers to perform repetitive pre-entry log-on tasks and send short messages * Programmable prompt or delay for send next line * Selectable character trapping * Send up to ten short messages (KSMs), each up to 255 characters long, automatically, to save money when calling long distance.

All versions allow tape load and save of files and KSMs, but the disk version also has the Mini Disk Operating System common to the

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VIP Database™

INCLUDES MAIL MERGE CAPABILITIES TOO! By Tim Nelson

This high speed MACHINE LANGUAGE program fills all your information management needs, be they for your business or home. And it does so better than any other database program for the Color Computer, featuring machine code, lowercase screens and mailmerge capabilities. Inventory, accounts, mailing lists, family histories, you name it, the VIP Database™ will keep track of all your data, and it will sort and merge VIP Writer™ files.

The VIP Database™ features the Library Memory Sense with BANK SWITCHING and selectable lowercase displays for maximum utility. It will handle as many records as fit on your disk or disks. It is structured in a simple and easy to understand menu system with full prompting for easy operation. Your data is stored in records of your own design, each divided into up to 255 fields. Each field will hold up to 255 characters. All files are fully indexed for speed and efficiency. Full sort of records is provided for easy listing of names, figures, addresses, etc., in ascending or descending alphabetic or numeric order. You may also combine files, sort and print mailing lists, print "boiler plate" documents, automatically insert text in standardized forms, address envelopes - the list is endless. The math package even performs arithmetic operations and updates other fields. Create files compatible with the VIP Writer and VIP Terminal. Up to five different print formats are available, and control codes may be imbedded for use with all printers.

As with all other Library programs, the Database features the powerful Mini Disk Operating System.

32K DISK \$59.95

RAVED ABOUT IN THE APRIL 1983 "RAINBOW!"

By Tim Nelson

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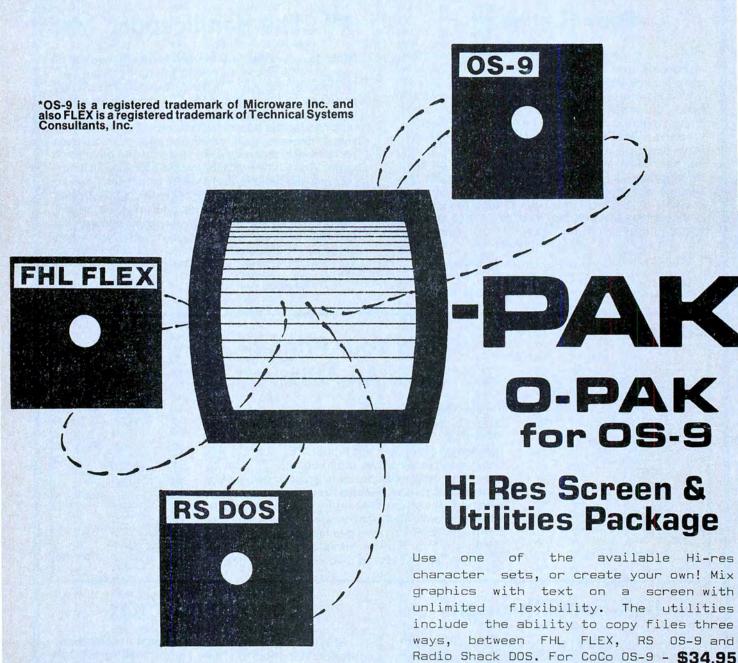
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Picture getting your instantaneous investment report, incorporating it in your spreadsheet calculation, generating a report, and writing a memo incorporating that report and data from your database, all with **Library** programs. Then you can transmit the report to work, or wherever, long distance. The **VIP Terminal**¹⁴ will become the hub of your Library.

FEATURES: Memory-Sense with BANK SWITCHING for full use of workspace, from 16 to 64K * Selectively print data at baud rates from 110 to 9600 * Full 128 character ASCII keyboard * Automatic graphic mode * Word mode (word wrap) for unbroken words * Send and receive Library files, Machine Lanuage & BASIC programs * Set communications baud rate from 110 to 9600, Duplex: Half-Full/Echo, Word length: 7 or 8, Parity: Odd/Even or None, Stop Bits: 1-9 * Local linefeeds to screen * Save and load ASCII files, Machine Code & BASIC programs * Lowercase masking * 10 Keystroke Multiplier (MACRO) buffers to perform repetitive pre-entry log-on tasks and send short messages * Programmable prompt or delay for send next line * Selectable character trapping * Send up to ten short messages (KSMs), each up to 255 characters long, automatically, to save money when calling long distance.

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All Disk Programs are also available on 3" Diskettes for the Amdek Color AMDISK-III Micro-Floppy Disk System for an additional \$3.00 each. ©1983 by Softlaw Corporation

The Limousine Utility: A Tape To Disk Transfer Vehicle

By Roger Schrag

hen lots of folks first get a Color Computer, they hook up a cassette recorder to save their programs on, figuring they will get a disk drive later on. By the time they do get a disk drive, they have accumulated a large library of program and data files on tape.

It then becomes something of a chore to transfer all of those files from tape to disk. A BASIC program needs to be *CLOADed* from tape and *SAVEd* to disk. A machine language program needs to be *CLOADMed* from tape, analyzed so that the addresses may be found, and finally *SAVEMed* to disk. Transferring data files, meanwhile, can often be a total nightmare.

What I would like to present here is a simple tape to disk file transferring utility. The source code is shown in the program listing, and may be keyed in and assembled with most any Editor/Assembler in a straightforward manner.

In short, this utility will read just about any standard tape file and transfer it to disk. The disk file will have the exact same attributes (BASIC or machine language, ASCII or binary, etc.) as the tape file, and the disk file will be fully loadable and operational.

To transfer a file from tape to disk, load the assembled program and execute it. The screen will clear and you will be prompted to prepare the cassette containing the file to be transferred and to press [ENTER]. Cue the tape to the beginning of the file and press [ENTER]. The tape's sound will be played over the TV's speaker to aid you in locating the recording on the cassette. If you cue the tape badly and the tape starts out in the middle of the file, don't worry; simply reposition the tape to the beginning. The transfer utility will sift patiently through the middle of a file, or even through garbage, until it finds what it's looking for.

When the transfer utility does find the beginning of a file, it will stop the recorder and print the file's name and type. You will be asked if you wish to transfer this file. If you do, press the Y key. Otherwise press the N key. You will be prompted to prepare the cassette again.

As the file loads in, a block will blink in the upper left corner of the screen. If there isn't enough memory to hold

(Roger Schrag, currently studying computer science at the University of California at Berkeley, enjoys working with CoCo and writing articles for the Rainbow. He also designs and translates programs for Adventure International.) the whole file, or if there is an I/O error, a message will be printed and the transfer terminated. You will then be invited to start the transfer utility over again or return to BASIC.

BASIC programs saved in non-ASCII form and machine language programs saved with the *CSAVEM* command are organized differently on disk than on tape. So when the tape file is fully loaded into memory, the transfer utility will automatically reformat the data as needed so that it will work correctly on disk. (BASIC programs saved in ASCII form, data files, and machine language programs created by *EDTASM*+ don't need any modifying.)

When the tape file is finished loading and reformatting is complete, a message to this effect will appear on the screen. You will now be asked for the name you wish to give to the disk file. Enter any filespec that is valid in BASIC but don't enclose it in quotes. If you don't specify an extension, none will be used, and if you don't specify a drive number, the default will be used.

The transfer utility will next save the file onto disk. If an error occurs anywhere along the way, a message will be printed and you will be prompted again to enter the name for the disk file. So, if an error occurs while saving to disk, you won't have to reload the tape file all over again.

When the file has been successfully saved on disk, you will be asked if you would like to start the transfer utility anew. If you have more tape files to transfer, then press the Y key. Pressing the N key will return you to BASIC.

At any time the transfer utility is waiting for keyboard input, you may press [BREAK] to cancel the transfer in progress. You will then be asked if you would like to start over again or return to BASIC.

This utility will transfer any BASIC program, BASIC program saved in ASCII, machine language program created by *CSAVEM*, machine language program created by *EDTASM*+, or just about any data file to disk easily and accurately. It very well may not transfer protected programs or automatic execute loaders.

One interesting note: On cassette, there is no distinction between data files and BASIC programs saved in ASCII. That is, there is no way to tell whether a file was created with the command *OPEN*"O",-1"NAME" or with the command *CSAVE* "NAME",A. What does this mean? If you use the utility to transfer a BASIC program saved in ASCII, you will be told that the file is a data file, even though it is actually a BASIC program. There is no harm in this, however, because

the disk file created will load correctly with the LOAD command, in spite of being labeled as a data file.

All files created by the Color Computer start out with a 15-byte block of data called a Header. The Header contains the filename, the file's type, whether it is in ASCII or binary, and whether the tape recorder must be turned off and back on between loading each block of code. This leaves four bytes which are usually unused. The one exception is in machine language programs saved by the CSAVEM command. Here, the last four bytes contain the program's start and execute addresses. The transfer utility uses all of the information in a file's header to load it properly and reformat it if necessary. Some of this information is then transferred into the disk directory.

This utility uses three undocumented routines in the disk ROM. It checks to see which version of the disk ROM you have, and then branches to the appropriate address.

That about rounds out The Tape to Disk File Transfer Utility. If you have any questions or comments, feel free to drop me a line. If you'd like, you may purchase the source code on cassette for \$5. My address appears at the top of the program listing.

The listing:

00001	************************
00002	* TAPE TO DISK FILE TRANSFER *
00003	**********
00004	•
00005	*By: -
00006	* Roger Schrag
00007	* 2054 Manning Avenue
80000	* Los Angeles, CA 90025
00009	• COS
00010	•

1000			00011	ORS	\$100
1000	10CE	1000	00012 START	LDS	#\$10
1004	86	7E	00013	LDA	#\$7E
1004	8E	1182	00014	LDX	#ERR
1009	B7	018E	00015	STA	\$18E
1000	BF	018F	00016	STX	\$18F
100F	8E	1460	00017	LDX	#BUF
1012	A6	84	00018 ML00P	LDA	, X
1014	43		00019	COMA	
1015		84	00020	COM	, X
1017		84	00021	CHPA	, X
1019	26	04	00022	BNE	GOTH
1018	63	80	00023	COM	, X+
1010		F3	00024	BRA	HLOO
101F	30	89 FF00	00025 SOTHEN	LEAX	-\$100
1023	BF	143C	00026	STX	TOPH
	10CE	1000	00027 BESIN	LDS	#\$100
102A	86	60	00028	LDA	#\$60
102C		0400	00029	LDX	#\$400
102F		88	00030	STX	\$88
1031	A7	80	00031 CLS	STA	, X ÷
1033		0900	00032	CMPX	#\$600
1036		F9	00022	BLO	CLS
1038			00034	CLRB	-
1039	BD	A99D	00035	JSR	\$A991
103C	38	128F	00036	LDX	#TITE
103F	BD	11F1	00037	JSR	PRINT
1042	BD	11F9	00038	JSR	INPUT
1045		0985	00039	CLR	\$985
1048		0986	00040	CLR	\$986
104B		FF40	00041	CLR	\$FF40
104E	AD	9F A004	00042 BETHED	JSR	[\$A00
1052	38	1450	00043	LDX	#HEAD
1055		7E	00044	STX	\$7E
1057		9F A006	00045	JSR	[\$A00
105B		7C	00046	TST	\$7C
105D		EF	00047	BNE	GETHE
105F		81	00048	TST	\$81
1061	26	EB	00049	BNE	SETHE
1063	BD	11DE	00050	JSR	MTROF

	\$1000	Low area of sesory
	#\$1000	Set up stack
	#\$7E	Opcode for JMP nn
	#ERROR	Address to JMP to
	\$18E	Patch into Basic's
	\$18F	Error vector
	#BUFFER	
	, X	Read a byte
Ą		Complement register
	, X	Complement RAM
A	, X	Is the RAM good?
	GOTHEN	If not, stop the test
	, X+	Restore byte and go
	HLOOP	Check more bytes
(-\$100, X	
	TOPHEN	Set top of memory
	#\$1000	Reset stack pointer
	#\$60	Blank on the screen
	#\$400	Top of screen
	\$88	Place cursor there
	, X+	Clear the screen
(#\$400	One byte at a time
	CLS	
3		Use ROM routine to
	\$A99D	Activate tape AUDIO
	#TITLE	Title message
	PRINTH	Print the message
	INPUT	Wait for Enter key
	\$985	Shut off drives so
	\$986	They won't run endlessly
	\$FF40	During cassette I/O
	[\$A004]	
	#HEADER	Tell ROM to read data
	\$7E	Into HEADER buffer
	[\$A006]	Read some data
	\$7C	Was it a file header?
	GETHED	Try again if not
	\$81	Was there an IO error?
	GETHED	Try again if so
	MTROFF	Shut off tape motor

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1066		04A0	00051		LDX		Set cursor position	- 1	1123	90	1463	00131		CHPX	#BUFFER	+3 The three extra bytes
1069 106B		88 12E1	00052 00053		STX	\$88 \$TNAME	At mid screen "Filename is"		1126		F7	00132		BH1	FIX2	Are at the beginning
106E	2000	11F1	00054		JSR	0.0000000000000000000000000000000000000	Print the message		1128		143E	00133		LDD	EOF	Bet length of file
1071		1450	00055		LDX		Point to filename		112B 112E		1463 83	00134 00135		SUBB	#BUFFER	+3 Minus three Add it into file
1074	C6	08	00056		LDB	##8	8 characters long		1130		FF	00135		LDA	#\$FF	Make very first byte
1076		80	00057	PNAME	LDA	, X+	Get character		1132	100000	82	00137		STA	, -X	Of file an SFF
1078		11E7	00058		JSR	VIDEO	Print on screen		1134		0520		NOTBAS	LDX	#\$520	Set cursor position
1078		EO	00059		DECB	PNAME	Decrement counter Print whole name		1137		88	00139		STX	\$88	At aid screen
107E		F8 12F4	00061		LDX	000000000000000000000000000000000000000	"It is a"		1139		1353	00140		LDX		"Load is complete"
1081		11F1	00062		JSR		Print the message		113C 113F		11F1	00141	RETRY	JSR LDX	PRINTH	Print the sessage "Disk filename?"
1084		1287	00063		LDX		Table of types		1142	0.20	1368 11F1	00143	KEIKI	JSR	PRINTH	Print the sessage
1087	B6	1458	00064		LDA	HEADER+	Get file's type		1145		11F9	00144		JSR	INPUT	Bet the filename
108A		02	00065		CMPA	#\$2	Is it legal?		1148		1458	00145		LDX		8 Get file's type
1080		02	00066		BLS		Skip ahead if so		114B	BF	0957	00146		STX	\$957	Store it
108E		03	00067	OKTYPE	LDA LSLA	##3	It's "Non standard" Type times two		114E	B6	095A	00147		LDA	\$95A	Bet default drive #
1070		86	00069	OKITE	LDX	A, X	Get addr off table		1151		EB	00148		STA	\$EB	Store it
1093		11F1	00070		JSR		Print the message		1153		094C	00149		LDX LDA	#\$94C #\$20	Clear out the
1098	8E	133D	00071		LDX	EXFERIT	"Transfer it?"	1	1156 1158		20 80		BLANK	STA	, X+	Filename storage Area
1099		1224	00072		JSR	YESNO	Bet yes or no	1 1	115A		0957	00152	DETIMIN	CMPX	#\$957	***
1090		88 ,	00073		BNE	BEGIN	If no, try again		115D		F9	00153		BLO	BLANK	•••
109E		1460	00074		LDX		Start of memory		115F	8E	1440	00154		LDX	#INKEY	Hame person entered
10A1		145A	00075	TLOAD	BRA TST	SYNC	Jump into load loop OA Need to resyncronize?		1162	0.000	FF	00155		LDB	##FF	Prepare B
10A6		0B	00075	ILUND	BED		Skip routine if not		1164				BETLEN	INCB		Bet the length of
10A8		10	00078	SYNC	PSHS	X	Save X		1165		85 50	00157		TST	B, X	The person's entry
10AA		11DE	00079		J9R		Turn off tape motor		1167 1169		FB 1176	00158 00159		DNE LDU	BACK	Into B Put return address
10AD	AD	9F A004	00080		JSR	[\$A004]	Resyncronize		116C		40	00150		PSHS	U	Onto stack
1081		10	00081		PULS	X	Restore X		116E		E2	00161		CLR	,-8	Make space on stack
1083		7E		NOSYNC	STX	\$7E	Tell ROM where to put data		1170	CE	127B	00162		LDU		Use ROM routine to
10B5		9F A006	00083 00084		JSR LDB	1\$A006]	Load some data Code for I/O ERROR		1173		126D	00163		JMP	USEROM	Prepare the filename
1088		81	00085		TST	\$81	Was there an IO?		1176		4F	00164	BACK	LDA	884F	ASCII O for Output
	1026		00086		LBNE	ERROR	Branch if so		1178 117A		01 127F	00165 00166		LDU	#DOPEN	Use device #1 (disk) Use ROM routine to
1001	96	7C	00087		LDA	\$7C	Check block's type		1170		126D	00167		JSR	USERDM	Open the file
1003	81	FF	00088		CMPA	##FF	End of the file?		1180		1460	00168		LDX		Start of memory
1005		0F	00089		BE₽	TAPEND	Skip ahead if so		1183		01	00169		LDA	881	Select output device
1007		0051	00090		DECA		Valid data block?		1185	97	6F	00170		STA	96F	#1 (the disk file)
1008	1026	143C	00091		LBNE	ERROR Tophen	I/O ERROR if not		1187		80		DWRITE	LDA	, X+	Bet a byte
10CF		D2	00072		BLO	TLOAD	Out of buffer space? Loop back if not		1189		10	00172		PSHS	X	Save X
1001		FF	00094		LDB	##FF	Code for BUFFER FULL		118B 118F		9F A002	00173 00174		JSR PULS	X	Write it to file Restore X
1003	7E	1182	00095		JMP	ERROR	Cause the error		1191		143E	00175		CMPX	EOF	More to write?
1006		143E		TAPEND	STX	EOF	Save the file's end		1194		F1	00176		BLO	DWRITE	Skip back if so
1009		11DE	00097		JSR	HTROFF	Shut off tape motor		1196	CE	1283	00177		LDU	#DCLOSE	Use ROM routine to
1000		1458	00098		LDA		B Get file's type		1199		126D	00178		JSR	USEROM	Close the disk file
10DF		02 2F	00099		CMPA BNE	#\$2 Nothl	Was it M.L. program? Skip ahead if not		1190		1379	00179	FTHT511	LDX		"Transfer complete"
10E3		145A	00101		TST		OA In CSAVEN form?		119F 11A2		11F1 13C4	00180	FINISH	JSR LDX	PRINTM #ABAIN	Print the message "Start program anew?"
10E6	26	2A	00102		BNE	NOTHL	Skip ahead if not		11A5		1224	00182		JSR	YESNO	Bet yes or no
							SAVEM must be edited			1027		00183		LBEQ	BEGIN	Restart if yes
							roperly from disk		11AC		71	00184		CLR	\$71	Make it a cold start
10E8		0A 143E	00105		LEAX	\$0A,X EOF	Change EDF to make		11AE	4E	9F FFFE	00185		JMP		Reinitialize system
10E		145B	00107		LDD		File 10 bytes longer OB Bet EXEC address		1100	74	04					when any error occurs
10F0		83	00108		STD	,X	Put it at very end		11B2 11B4		1283	00188	ERROR	PSHS LDU	B B	Save error code Use ROM routine to
10F2	6F	82	00109		CLR	, -X	Preceed EXEC address		1187		126D	00189		JSR		Close the disk file
10F4		82	00110		CLR	, -X	By two zeroes		11BA		22	00190		BSR	MTROFF	Shut off tape motor
10F6		FF	00111		LDA	##FF	Preceed all that by		11BC	E6	E4	00191		LDB	,S	Get error code
10F8		82 1A	00112		STA	, -X	An \$FF		11BE		1309	00192		LDU	DERRS	Table of error codes
10FA		82	00113		LDA Sta	-6, X , -X	Move the entire file Over five bytes. This		1101		CI		GETERR	LDX	,U++	Get addr of message
10FE		1465	00115		CHPX		5 Leaves five bytes		11C3 11C5	E1 27	Ç4 04	00194 00195		CMPB BEQ	.U BOTERR	Compare codes Skip ahead if match
1101		F7	00116		BHI	FIX1	At the very beginning		11C7		CO	00196		TST	,U+	End of table?
1103		145D	00117		LDD	HEADER+	OD Bet START address		1109		F6	00197		BNE		Skip back if not
1106		83	00118		STD	,X	Add it into file		11CB		11F1		GOTERR	JSR		Print error message
1108		143E 146A	00119		LDD	EOF	Set length of file		11CE		04	00199		PULS	B	Restore error code
110		146A 83	00120 00121		SUBD Std	*BUFFER-	\$0A Minus 10		11D0 11D3		1399 01	00200 00201		LDX CMPB	#CANCEL	"Function cancelled" Cancel procedure if
1110		82	00121		CLR	,x	Add this into file Make first byte zero		11D5		C8	00201		BEQ		Error occurred while
1112		1458		NOTHL	TST		Is it Basic program?		1107		FF	00203		CMPB	#\$FF	Loading the tape file
1115	26	1 D	00124		BNE	NOTBAS	Skip ahead if not		11D9	27	C4	00204		BEQ	FINISH	But if file loaded OK,
	DF.	1.175					also must be edited		11DB		113F	00205	u===-	JMP	RETRY	Then ask again for filename
1117		143E 03	00126		LDX	EOF	Change end of file		11DE		FF21		HTROFF	LDA	\$FF21	Shut off tape motor
	BF	143E	00127		LEAX STX	3, X EOF	To make the file Three bytes longer		11E1 11E3		F7 FF21	00207 00208		ANDA STA	\$\$F7 \$FF21	Reset the bit in PIA Store it in PIA
1111		10		FIX2	LDA	-4, X	Move entire file		11E6				RETURN	RTS	21164	Return
	A7	82	00130		STA	, -X	Over three bytes, so		11E7		16	00210		PSHS	X,D	Save X and D

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11E9 OF	6F	00211	CLR	\$6F	Device #0 (screen)	1		00291				
11EB AD	9F A002	00212	JSR		Print character				-	es and p	rospts	
11EF 35	96 80	00213 00214 PRINTH	PULS LDA	, 1, 20	Restore and return Bet a byte of message			00293				
11F1 A6 11F3 27	F1	00214 FRIAIN	BEO	RETURN	All done if a zero	128F	20	00275		FCC	" TAPE	TO DISK FILE TRANSFER®
11F5 8D	F0	00216	BSR	VIDEO	Otherwise print it	1288	OD	00296		FCB	\$OD	
11F7 20	FB	00217	BRA	PRINTH	Loop back for more	12AB	20	00297		FCC		EESESSESSESSESSESSES
11F9 BE	1440	00218 INPUT	LDX	BINKEY	Start of inkey buffer	1206	ODOD	00298		FDB	\$ODOD	
11FC BD	42	00219 IN1	BSR	BETKEY	Bet a key	1208	52	00299		FCC	"READY	TAPE & HIT ENTER? "
11FE 81	OD	00220	CMPA	#\$0D	Enter key?	12E0	00	00300		FCB	\$0	
1200 26	04	00221	BNE	IN2	Skip ahead if not	12E1	54	00301 1	NAME	FCC		LE IS NAMED "
1202 6F 1204 20	84	00222 00223	CLR Bra	,X VIDEO	Put 0 at end of data Print CR and return	12F3	00	00302		FCB	\$0	
1204 20	E1 08	00223 00224 IN2	CMPA	9\$8	Backspace?	12F4 12F5	0D 49	00303	ITTE	FCB FCC	\$0D	
1208 26	OB	00225	BNE	IN3	Skip ahead if not	12FB	00	00305		FCB	*IT IS	
120A BC	1440	00226	CHPX	BINKEY	Anything to backspace over?	12FC	41	00306 T	YPE1	FCC		C PROGRAM*
120D 27	ED	00227	BEQ	IN1	Ignore it if not	130B	00	00307		FCB	90	
120F 6F	82	00228	CLR	, -X	Erase char from buffer	130C	41	00308 1	YPE2	FCC	"A DATA	FILE*
1211 BD	D4	00229	BSR	VIDEO	Erase it from screen	1317	00	00309		FCB	10	
1213 20	E7 20	00230 00231 IN3	BRA CMPA	IN1 #\$20	Branch back for more Non-alphanumeric?	1318	41	00310 1	YPE3	FCC	"AN H.L	. PROGRAM"
1215 81 1217 25	E3	00231 1#3	BLO	IN1	Ignore it if so	1327	00	00311		FCB	\$0	
1219 BC	144F	00233	CMPX		sof Is buffer full?	1328	49	00312 1	TYPE4	FCC		STANDARD FORM"
121C 27	DE	00234	BEQ	INI	Ignore it if so	133C 133D	OO OD	00313	VEEDIT	FCB FCB	\$0 \$0D	
121E A7	80	00235	STA	, X+	Put char in buffer	133E	54	00315	AFERII	FCC	2007	ER THIS FILE? "
1220 BD	C5	00236	BSR	VIDEO	Print it on screen	1352	00	00316		FCB	\$0	LN 11120 1 122.
1222 20	D8	00237	BRA	IN1	Branch back for more	1353	54	00317 L	DCOMP	FCC		AD IS COMPLETE®
1224 BD	11F1	00238 YESNO	JSR	PRINTH	Print prompt	1367	00	00318		FCB	\$0	
1227 BD 1229 B1	17 4E	00239 YN1 00240	BSR CMPA	BETKEY #\$4E	Get key Is it "N"?	1368	OD	00319	NAME	FCB	\$OD	
1227 81 1228 26	08	00240	BNE	YN2	Skip ahead if not	1369	44	00320		FCC	"DISK F	ILENAME? "
122D BE	1438	00242	LDX	#NO	*No*	1378	00	00321		FCB	\$0	
1230 BD	BF	00243	BSR	PRINTH	Print the message	1379	OD	00322 4	LDONE	FCB	\$OD	
1232 BA	FF	00244	DRA	#SFF	Reset equal flag	137A	54	00323		FCC		LE TRANSFER IS COMPLETE"
1234 39		00245	RTS		Return	1397 1399	ODOO OD	00324	ANCEI	FDB	\$0D00	
1235 81	59	00246 YN2	CMPA	#\$59	Is it "Y"?	1377 139A	54	00325 C	HALEL	FCB FCC	\$0D	OCEDURE HAS BEEN CANCELLED"
1237 26	EE	00247	BNE	YM1	Branch back if not	13BA	00	00325		FCB	\$0	DEEDONE IMS DEEN CHREELED
1239 BE 123C BD	1433 B3	00248 00249	LDX BSR	#YES	"Yes"	13BB	3C	00327 00328 B	REAK	FCC	*(BREAK	\•
123E 4F	B 3	00250	CLRA	PRINTM	Print the message Set equal flag	1302	0000	00329		FDB	\$0D00	,
123F 39		00251	RTS		Return	1304	53	00330 A	GAIN	FCC	"START	PROGRAM ANEW? "
1240 34	14	00252 GETKEY	PSHS	B, X	Save B and X	1308	00	00331		FCB	\$0	
1242 A6	9F 0088	00253 KEY1	LDA	[\$88]	Get cursor character	1309	13E8	00332 E	RRS	FDB	E1	
1246 8B	10	00254	ADDA	#\$10	Blink it	13DB	38	00333		FCB	\$38	
1248 BA	8F	00255	DRA	##8F	Make it graphic	13DC	13F8	00334		FDB	E2	
124A A7	9F 008B	00256	STA	[\$88]	Print new cursor	13DE 13DF	3C 1410	00335		FCB FDB	\$3C	
124E BE	0800	00257	FDX	#\$80	Loop counter	13E1	3E	00337		FCB	\$3E	
1251 30 1253 27	1F ED	00258 KEY2 00259	LEAX BEQ	-1,X KEY1	Decrement counter Blink cursor if time	13E2	141D	00338		FDB	E4	
1255 AD	9F A000	00250	JSR		Scan keyboard	13E4	FF	00339		FCB	\$FF	
1259 4D		00261	TSTA	A-1445.5.5.5.5.	Was key pressed?	13E5	1429	00340		FDB	E5	
125A 27	F5	00262	BEQ	KEY2	Branch back if not	13E7	00	00341		FCB	\$00	
125C BE	13BB	00263	LDX		"(BREAK)"	13E8	44	00342 E		FCC		PACE FULL"
125F 81	03	00264	CHPA	#\$3	Was it Break key?	13F7	00	00343		FCB	\$ 0	
1261 1027		00265	LBEQ		Break out if so	13F8	44	00344 E	2	FCC		S WRITE PROTECTED"
1265 C6 1267 E7	60 9F 0088	00266 00267	LDB Stb	0960 [\$88]	Blank character	140F	00	00345		FCB	\$0	PHANE
1268 35	94	00268	PULS		Erase cursor Restore and return	1410	42	00346 E	. 3	FCC	"BAD FI	FEMHUE.
	• •				a routine in the	141C	00	00347		FCB	\$0	
					for the differences	141D	42	00348 E	4	FCC	"BUFFER	FULL*
				xtended	Color Basic 1.0 and 1.1	1428	00	00349		FCB	\$0	
126D 34	02	00272 USEROH		A	Save A	1429	49	00350 E	:0	FCC	*1/0 ER	ROR"
126F B6	C005	00273 00274	LDA Anda	\$C005	Check which version ROM Zero=1.0 One=1.1	1432 1433	00 59	00351 00352 Y	/EC	FCB FCC	\$0 "YES"	
1272 84 1274 48	01	00275	LSLA	#\$1	Zero=1.0 Two=1.1	1		00353		FDB	\$0D00	
1275 33	63	00276	LEAU	A,U	Increment U if ROM 1.1	1436 1438	0D00 4E	00354 N		FCC	*NO*	
1277 35	02	00277	PULS	A	Restore A	1430	4F	VV354 R		100	Nu	
1279 6E	D4	00278	JMP	[,U]	Use ROM routine	143A	0000	00355		FDB	\$0D00	
127B	CBA4	00279 DFNAME		\$CBA4	1.0 Process filename			00356	F			
1270	C952	00280	FDB	\$C952	1.1 Process filename			00357 #		20	127 10	
127F 1281	C468 C48D	00281 DOPEN 00282	FDB FDB	\$C468 \$C48D	1.0 Open disk file 1.1 Open disk file					les and p	pointers	
1283	CA3B	00283 DCLOSE		\$CA3B	1.0 Close disk file	1		00359 #				
1285	CAE9	00284	FDB	\$CAE9	1.1 Close disk file	143C	0000	00361 T		FDR	\$0	End of system's memory
**************************************		00285 *Tape f				143E	0000	00362 E		FDB	\$0	End of tape file
1287	12FC	00286 TTYPES		TYPE1	Basic program	1440		00363 1		RMB	\$10	Space for input buffer
1289	130C	00287	FDB	TYPE2	Data file	1450		00364 H		RMB	\$10	Space for tape file header
128B	1318	00288	FDB	TYPE3	N.L. program	1460	1000	00365 B	RUFFER			t is for the BUFFER
128D	1328	00289 00290 #	FDB	TYPE4	Non standard	00000 TO	1000	00366		END	START	Execution begins at START
		AATIA #				00000 10	TAL ERRORS					

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Rainbow, Nov. 1983



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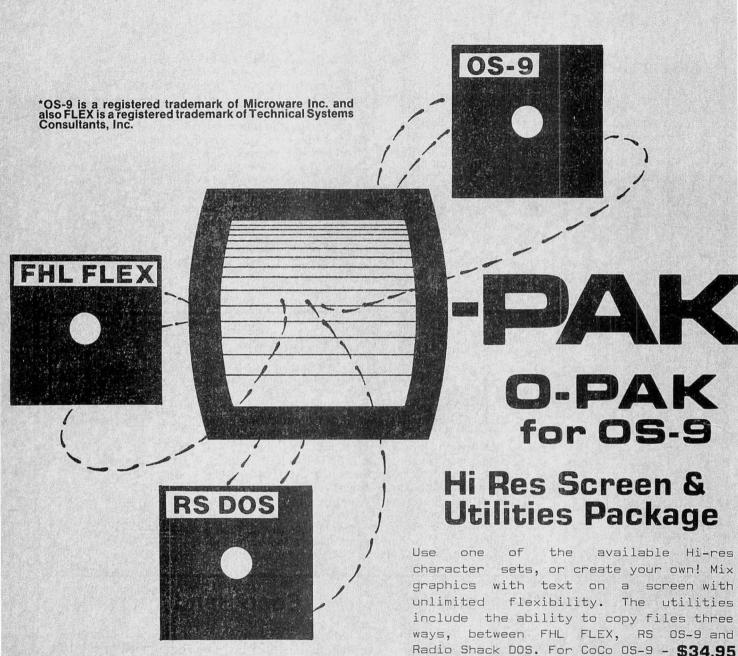
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Getting Started With Machine Language

By Dan Downard

Rainbow Technical Editor

ow many of you have noticed the assembly listings in the Rainbow and just gone to another article, since "I'm not interested in that anyway," or "I don't know how to input that program into my CoCo." If you answered yes to the "not interested" comment, go to the next article. If you want to input one of these listings, read on and we guarantee you will be an expert in one quick lesson. In this article, we will give you a machine language program, show you three different ways to input it into the CoCo, and how to save it on tape for future use.

For this exercise you will need an understanding of hexadecimal numbers, a CoCo with at least 16K of memory (Non-Extended is fine) and a monitor such as *C-Bug, HUMBUG* or *ZBUG*. As you probably know, *ZBUG* is the Radio Shack monitor for all of the examples. Other monitors will work fine, but we have to start somewhere.

The Program "LF"

Listing I is a short machine language program that should be of interest to all of you using non-Radio Shack printers. It adds a line of feed after carriage return for those printers that require line feeds to be added by the computer. Don't give up if you have a Radio Shack printer. The program will still work, but you will notice double spacing. After all, our interest here is in just getting the program to run.

Notice Listing I is divided into eight different columns of information. For this discussion, a column may be more than one digit long. For example, the fourth column is the line number as we are accustomed to seeing in BASIC programs. This particular program starts with Line 00100 or 100. We will refer to the line number several times, so be sure you can identify it.

Remember, in BASIC, how a REM or [7] command was

ignored by the actual program, but inserted in programs for reference. The equivalent instruction in the assembly listing is [*]. When a [*] is encountered in a program, all of the line that follows can be considered a remark and inputting is optional. That means, in Listing 1, Lines 100 through 150 are for reference only and just explain what the program is all about.

What is all the rest of that garbage? Well, to jump ahead a little bit, all of the information to the right side of the line number, including the line number itself, is what we call the assembly text file. All of the information to the left of the line number is the actual machine language program in hexadecimal form. Depending on which method we use to input our program we will use part of this information to perform the chore.

Method #1-Using and Assembler

An assembler is a program that converts mnemonic instructions into actual machine code. We do not have to understand how the actual program works to use the assembler. Again, just picture the assembler as a language like BASIC. If we input a program and save it, all we have to do to run it again is type *CLOADM* and *EXEC*.

Back to Listing 1. Columns 4 thru 7 contain all of the information necessary to input a machine language program using an assembler. A short explanation of each column of text is in order. Let's use Line 190 as an example:

Column 4-00190 — The line number Column 5-START — Symbol Column 6-LDX — Command (or Mnemonic) Column 7-1+HOOK — Operand

Column 8 is not used in this particular program, but is an optional comment field. Again, inputting any comments can be left up to the user. In the actual operation of *EDTASM*+, these columns are called fields and seperated by inputting a right arrow.

The first thing we must do is plug in our *EDTASM*+ cartridge. Be sure the CoCo is turned off. After seeing the

(Dan Downard is an electrical engineer and has been involved in electronics for 24 years through ham radio (K4KWT). His interest in computers began about five years ago and he has built several 68XX systems.)

logo and the [*] prompt we are ready to go. Type [I] and then hit the [ENTER] key and 00100 should appear. This gives you auto line numbering starting at 100, incrementing each line number by 10. Sounds good already, doesn't it? Using [RA] for the right-arrow key and [E] for enter we would use the following keystrokes to input the program:

00100 *LF-RAINBOW JAN 1984[E]

00160 HOOK[RA]EQU[RA]\$0167[E]

00170 PRTOUT[RA]EQU[RA]\$A2BF[E]

00180 [RA]ORG[RA]\$3F00[E]

00190 START[RA]LDX[RA]1+HOOK[E]

00200 [RA]STX[RA]1+OUT2,PCR[E]

00360 [RA]END[RA]START[E]

00370 [BREAK]

A few comments are in order. First, auto line numbering does not have to be used. If a listing is not in a logical sequence, just hit [BREAK] and [I] and the next line number. Second, always make sure your text is in the proper field (column). Some fields will be empty, but don't worry about it.

When all of the text is entered prepare your tape recorder and type A LF[ENTER]. This will "assemble" your text file into a machine language program and store it on cassette. If it is a long program it is usually a good idea to save the text file for future reference using the "W" command.

Turn off the computer, remove the *EDTASM*+ cartridge, turn it back on and type *CLOADM*"LF" and *EXEC*. You're in business. Any printer output will now contain line feeds.

Method #2—Using a Monitor

If you don't want to type in the assembly text, there's an easier way. Just input the machine language program directly into memory with a monitor such as ZBUG. In Listing 1, the first three columns are the actual machine language program in hexadecimal form.

The first column is the address. The next two columns are the hex numbers that you will put at each respective address. The reason that two columns are displayed is that the second column always contains the op-code, or operational code, recognized as an instruction by the microprocessor. This op-code corresponds to the mnemonic instruction we referred to earlier in the assembly text file.

Let's input our program using ZBUG. First, we turn on the computer after the EDTASM+ cartridge has been inserted. Type Z and ENTER and you see a different prompt, a [#]. ZBUG is now waiting for your command. Since we wish to input hexadecimal bytes we type [B] [ENTER] to enter the Byte Mode. From this point, the only problem is knowing where to start.

If you examine Listing I, you will notice that the first line that has anything in Column 2 is Line 190. Aha! This must be the start of the program at address \$3F00. Very good. Just as a side remark, the data to the left of the line numbers in Lines 160 and 170 are just constants for program definition. Always start when you see data in the second column.

Notice that immediately following the address, I put an FF in the second column. This can be any value and is generated by *ZBUG*. It is the present value of data at that address before you change it.

Using [DA] for down arrow (enter data and advance address in ZBUG) and [E] for [ENTER], a session with ZBUG would go like this.

First, you see the [#] prompt already on the screen. So,

type 3F00 and a [/] slash mark. On hitting the slash mark, the value of the existing byte will appear and a flashing cursor will appear several spaces to the right. Okay?

Now, type BE and hit the down arrow. You will observe that the next address will be displayed, as well as its value. So, to continue, you enter the next hexadecimal byte, namely 01 and press the down arrow. If you accidentally hit [ENTER], simply pressing the slash mark will return you to the same address. If you enter an incorrect value, you can step back to a previous address by hitting the up-arrow key.

#3F00/ FF BE[DA]
#3F01 FF 01[DA]
#3F02 FF 68[DA]
#3F03 FF AF[DA]
#3F04 FF 8D[DA]
#3F05 FF 00[DA]
#3F06 FF 21[DA]
#3F07 FF 86[DA]
.....
#3F27 FF 7E[DA]
#3F28 FF 82[DA]
#3F29 FF 73[DA]
#3F2A FF [E]

After you have input the program type 3F00/ and keep hitting the [DA] key. You will see the program you have just input.

The only other problem we may encounter is the starting address of the program. The *EXEC* address of this particular program is \$3F00, but that may not always be the case. Read the accompanying article or the comments in the given listing you want to assemble to find the proper starting address.

After the program is in memory and you are still in ZBUG, type P LF 3F00 3F29 3F00 to save the program to tape. From now on, a CLOADM and EXEC will execute the program from BASIC.

Method #3—BASIC

Listing 2 is a short BASIC program that will allow you to input a machine language program into memory. Type in and *RUN* this listing. After entering the starting address at the prompt, you enter the same data as in Method #2. Instead of the down-arrow key, hit [ENTER] indicated by [E], after every byte something like this:

STARTING ADDRESS? 3F00[E] 3F00? BE[E] 3F01? 01[E] 3F29? 73[E] 3F2A? [BREAK]

After the program is in memory, you can save it by *CSAVEM*"LF",&H3F00,&H3F29,&H3F00. Be careful, as there is no way of checking for mistakes other than taking your time.

This method requires Extended BASIC, but no Monitor or Assembler. It is crude, but it works and can be used if you are desperate.

Summary

I hope you will try the different methods described and pick one that you are comfortable using; that's the real secret of success anyway. The next time one of your friends asks where you got that fantastic graphics program you can say, "I put it in myself from *the Rainbow!*"

			another					
machine	langua	ge, re	fer to this	mont	h's	"Assemb	oly Corn	er"
by Denn	is Lewa	andov	wski.					

Listing 1:

		00100	AL E-DAT	NBOW JAN	1004
		00110	#KEA 0-	DAN DOWN	AKD
		00120	*THIS P	ROGRAM W	ILL ADD
		00130	#A LINE	FEED EA	CH TIME
		00140	#A CARR	IAGE RET	URN IS
		00150	*OUTPUT	TO THE	PRINTER
	0167	00160	HOOK	EQU	\$0167
	A2BF	00170	PRTOUT	EQU	\$A2BF
3F00		00180		ORG	\$3F00
3F00 BE	0168	00190	START	LDX	1+H00K
3F03 AF	8D 0021	00200		STX	1+OUT2, PCR
3F07 86	7E	00210		LDA	#\$7E
3F09 B7	0167	00220		STA	HOOK
3F0C 30	8D 0004	00230		LEAX	OUT, PCR
3F10 BF	0168	00240		STX	1+H00K
3F13 39		00250		RTS	
3F14 34	05	00260	OUT	PSHS	B,CC
3F16 D6	6F	00270		LDB	<\$6F
3F18 C1	FE	00280		CMPB	#\$FE
3F1A 26	09	00290		BNE	OUT1
3F1C 81	OD	00300		CMPA	#\$0D

3F1E 26	05	00310	BNE	OUT 1
3F20 BD	A2BF	00320	JSR	PRTOUT
3F23 86	OA	00330	LDA	#\$0A
3F25 35	05	00340 BUT1	PULS	B,CC
3F27 7E	8273	00350 OUT2	JMP	\$8273
	3F00	00360	END	START
00000 TO	TAL ERROF	RS		

HOOK	0167
OUT	3F14
OUT1	3F25
OUT2	3F27
PRTOUT	A2BF
START	3F00

Listing 2:

10 'ML-RAINBOW JAN 1984
20 'REVO DAN DOWNARD
30 'THIS PROGRAM WILL ALLOW
40 'YOU TO INPUT MACHINE
50 'LANGUAGE PROGRAMS USING
60 'EXTENDED BASIC-HIT break
70 'WHEN YOU ARE FINISHED
80 INPUT"STARTING ADDRESS"; S\$
90 I=VAL("&H"+S\$)
100 PRINTHEX\$(I);:INPUT B\$
110 POKEI, VAL ("&H"+B\$)
120 I=I+1:GOTO100
/// \\I

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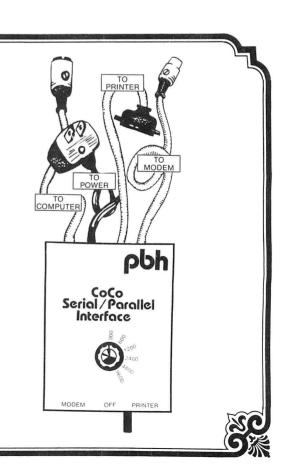
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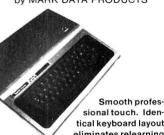
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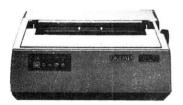
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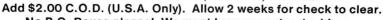
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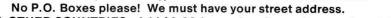
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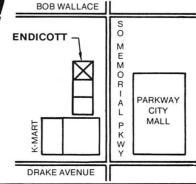
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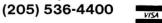
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For That Added Touch You Need Append

By Joseph Kolar Rainbow Contributing Editor

ow many times have you wanted to add a nifty routine or an entire program to one that you have just created? How you wished you wouldn't have to go through the drudgery of keying it into your program!

There is a technique that can make your wish come true. It is called *Append*. For our purposes, it means, "to add one program to another and by linking them together, to create an improved, expanded and enhanced program."

It is not necessary to append an entire program. Selected routines may be extracted, renumbered and appended.

Imagine that you created KOLARDES, (see Listing 1), a graphic program. You decide to dress it up by adding a nice title card. You have this program, +TITLE, (see Listing 2), that you would like to tack onto the front of your program.

+TITLE can be used over and over again. You will want to change lines 10060 and 10070 and put in your name and address. All that is needed is a neat name for your program.

+TITLE was made to give you practice following instructions. No doubt, you can make better title cards. You would be advised to make a copy of +TITLE after you are finished keying it in. Make sure you do this before following instructions in line 10300. This program sort of self-destructs and what you have when you finish is not what you started out with.

KOLARDES uses sound to enhance the random designs and to act as a counter. If the sounds bug you, feel free to change them. If they still bug you, turn the sound down. I think you will find the ever-changing designs amusing.

Before we begin, get a piece of 3 x 5 paper from the pad you keep on top of the monitor. With a red, felt-tipped pen, on top of the long side, print APPEND PROGRAM. Then with a black, felt-tipped pen, print below the title, the following:

- 1. CLOAD low numbered lines
- 2. *POKE* 25, *PEEK*(27) [ENTER]
- 3. *POKE* 26, *PEEK*(28)-2 [ENTER]

(Joseph Kolar is a free-lance writer and programmer dedicated to proselytizing for computers in general, and the CoCo specifically.)

- 4. CLOAD high numbered lines
- 5. (If you have Color BASIC,) POKE25,6[ENTER]
- 6. (If you have Extended BASIC,) POKE25,30 [ENTER]
- 7. *POKE* 26,1 [ENTER]

Consider this card a training aid and keep it in a handy location. Store it on top of the TV set next to the dispenser mentioned in the first article (December 1982). When appending a program, place the card on top of the computer, between the air vents for easy reference.

Note: If you have ECB and start up the computer, it will automatically PCLEAR4. If you are using a PCLEAR other than PCLEAR4, to find the correct number for line 5, (above), PRINT PEEK(25), before you CLOAD in the second program.

As usual, there is more than one way to do anything. You could *CLOAD* "+TITLE" and *RUN* and, following the instructions in +TITLE, complete the title card; *CSAVE* it; *NEW CLOAD* "KOLARDES," follow the instructions on your reference card; *CLOAD* "+TITLE" (which you finalized) and then finish appending. But, for the purpose of the demonstration, *do not* use the perfectly acceptable procedure above.

First, CLOAD"KOLARDES" per instructions from your handy reference card. Make sure it works properly. Make a note of the last line number in the listing. If you make a long spread-out, numbered listing, you may want to make it more compact by renumbering it. RENUM 10,10,10. The first "10" means that you want the new listing to start with Line number 10. The second "10" means that you want the renumbering operation to start with Line 10 of the original program. (This number could be any number.) The third "10" signifies that you want to increment each line number by 10. (10;20;30; etc.)

Look at Line 2 of the reference card. Carefully key it in. Do the same at Line 3.

CLOAD"+TITLE" and RUN. LIST to find the lowest line number in the program. This number must be greater than the last number of the first program.

It is good practice to renumber the appended program at this time. *RENUM* 10000,10,10 and [ENTER] usually is sufficient unless the highest number in the first program is

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Part ONE of the CSW User's Guide tells you how to use all of the programs in the Workbench. This first part contains one section for each program.



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- Screen Mode Editing
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- Specifying:
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 - Object and Listing to Tape, Disk, Screen or Printer
- Optional Symbol Table in the Object File for use by the Symbolic Debugger
- Explanation of Source Listing Format

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- Specifying:
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 - Object and Listing to Tape, Disk, Screen or Printer
- Explanation of Source Listing Format

OBJECT LINKER

- Specifying:
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 - O Listing to Tape, Disk, Screen or Printer
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Part TWO of the CSW User's Guide provides you with the background information needed to write programs using the Colour Software Workbench.

LEARNING EXERCISE

- Complete Pascal and Assembler Language Source
- Uses All Parts Of the Workbench
- Resulting Program is a Text Processor

PASCAL

- Describes Standard Language Elements Supported
- Constants Include Decimal and Hexadecimal Integers, ASCII characters and strings
- Types Include:
 - O Integer, Char, Boolean, Enumerated, Subrange
 - Multi-Dimensioned Arrays
 - O Records and Variant Records
 - Sets of Up to 256 Elements
 - o Files
- PROCEDUREs and FUNCTIONs with FORWARD
- Variables and LABELs
- Arithmetic, Boolean, and Set Expressions
- Statements: IF, WHILE, REPEAT, CASE, GOTO, EXIT, FOR, BEGIN, assignment (:=)
- Input/Output: RESET, REWRITE, READLN, EOF, WRITE, WRITELN, CLOSE, PAGE
- Built-in Functions and Procedures: ABS, CHR, CURSOR, ODD, ORD, PRED, SUCC

ADVANCED PASCAL

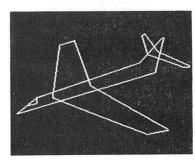
- Strings Support: Assignment, Comparing, Concatenation
- String Procedures and Functions: STRINGCOPY, STRINGDELETE, STRINGINSERT, STRINGPOS, HEX, ENCODE, DECODE
- Type Extensions for Structured Type Breaking
- Absolute Memory Access via Built-in WORD and BYTE Arrays
- ROM Routine Access via CALL Built-in Function
- Static and Public Variable Allocation
- Separate Compilation and Assembler Interface via INTERFACE, EXTERNAL, and PUBLIC
- Listing and Multiple Source File Directives
- Explanation of Error Messages

6809 MACRO ASSEMBLER

- Motorola Compatible Source Conventions
- Macro Facility With up to 9 Macro Parameters
- Separate Compilation and Pascal Interface via PUBLIC and EXT Directives
- Listing Control Directives
- Explanation of Error Messages

TECHNICAL NOTES

- CoCo ROM Compatibility
- Pascal Runtime Library Assembler Interface
- CSW Object File Format



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greater than 10000.

It is also good practice to keep all your appending programs on one cassette tape; to put a "+" in front of the program name; and to renumber all append programs so their starting Line number is 10000. You will know that any program with "+" in front of the title will begin with Line number 10000 and is for appending purposes.

Did you remember to change Lines 10060 and 10070?

When the +TITLE program is renumbered, RUN and follow the screen commands. Pick out a nice title for your main program. Note: You can copy the three inputs down, but once you get the hang of it, you should have no trouble keeping it in your head. After the "red title" appears, note the centering. If it looks right, [ENTER] and follow instructions. If you made a boo-boo [BREAK], and do it over.

Carefully retype Lines 10000—10020, making sure you put double quotation marks (") around the name of the title. Then DEL10300- and RUN. Your second program is now completed. Note: Even though KOLARDES is in memory, it is not disturbed when you RUN, LIST, RENUM the

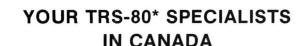
+TITLE program.

Now key in the appropriate Line 5 from your reference card. [ENTER]. Key in Line 6. [ENTER] and LIST. As the listing fast scrolls up you should be able to spot line numbers from both the main and the appended program and end with Line 10080.

Both programs are now combined, but not quite integrated to work as one unit.

The title of this program should appear first. Both programs have to be linked together. In this case, key in:

10 GOTO 10000 10100 GOTO 100





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You can see that we send the program to the title and after the title is created and displayed, we return to CLS and begin the main program.

RUN. It will work, but not as before! Can you figure out what is different?

When you ran KOLARDES by itself, after about 20 beeps Line 150 recycled to a random color. After appending the +TITLE program and linking them both together, Line 150 became inoperative and did not recycle after 20 beeps. Can you determine why?

Variables are the culprits. When the same variable is used in both programs, they may often be responsible for faulty

operation.

Looking over the two listings, we see that the variables "T" and "Z" are used in both programs. Changing the variable "T" to "G" in Lines 10020 and 10050 did not correct the problem. Changing the variable "Z" to "H" in Line 10080 solved the problem.

The variable "T" did have a minor but unimportant effect. (Line 150). "R" from Line 145 could have been used in Line 150 to replace "T." Why?

Now, you can add informational or instructional lines to the title; hold it with INPUT"Press [ENTER]";01 or send it to Line 100 after a few seconds with Line 10080.

Your program should be complete and work fine. You can use +TITLE with any program to add a title.

Be careful not to have the same line number in both programs. For instance, you can't have two Line 100s or you will drive the computer nuts.

Let's say for argument's sake that when you appended +TITLE that you inadvertently had Line numbers 100; 110 and 120 at the beginning of +TITLE. You did not notice this until you completed the appending procedure and listed it.

To get rid of the three unwanted lines that lie in the

200 NEXT K,J,: FOR P=1 TO 1000:NEXT: GOTO 120 100 'LEFT IN BY MISTAKE

110 'Print

120 'Print

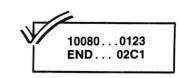
10000 PRINT:PRINT:PRINT:INPUT "YOUR TITLE";

- 1. Copy down the last line of the first program. (Line
- 2. Copy down the first line of the second program which you want to keep. (Line 10000)
- 3. <DEL210-10000>
- 4. Retype Lines 210 and 10000

The unwanted lines have gone bye-bye!

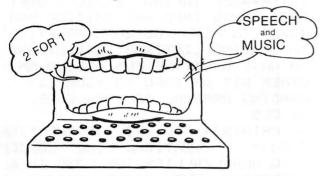
You've covered a lot of ground and added a new tool to your repertoire. You should be proud because you came a long way.

Listing 1



10000 PRINT:PRINT:PRINT:INPUT" YOUR TITLE"; A1\$ 10010 PRINT: INPUT" COUNT ALL LE TTERS AND SPACES IN THE TITLE. (IF RESULT IS AN ODD NUMBER, AD DIVIDE THE RESULT BY 2.

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L=" ; L 10020 PRINT: INPUT" 16-L="; T 10030 CLS 10040 FOR I= 1 TO 6:PRINT:NEXT 10050 PRINT TAB(T)A1\$ 10060 PRINT TAB(10) "JOSEPH KOLAR 10070 PRINT TAB(7) "INVERNESS, FL 10080 SCREEN 0,1:FOR Z=1 TO 1500 : NEXT 10300 PRINT@416," IF YOU ARE SA TISFIED WITH THE TITLE, PRESS <E NTER> ELSE PRESS <BREAK><RUN> AN D TRY AGAIN.";: INPUT 01 10310 CLS:PRINT:PRINT:PRINT" TYPE LINES 10000 TO 10020. REME MBER TO PLACE QUOTE MARKS AROU ND YOUR TITLE IN LINE 10000. 10320 PRINT: PRINT" 10000 A1\$=(YD UR TITLE) 10010 L=(LENG TH/2) 10020 T=16-L. 10330 PRINT: PRINT" DELETE LINES 10300-10330 AND APPEND THIS TO YOUR MAIN PRO-GRAM. DON'T F

Listing 2

100 CLS

110 J=0:K=0:ZZ=0

ORGET TO LINK IT

120 A=RND(63)-1:AA=RND(15)+1

130 B=RND(31)-1:BB=RND(31)

140 X=RND(8): Y=RND(4)

145 R=RND(8)

146 M=R+4

150 Z = Z+1 : IF Z = 20 THEN Z=0:

UP!

162 0123 END . . . 022B

CLS(T): GOTO 120

155 T=RND(8)

156 IF T=8 THEN SOUND 89,M

157 IF T=7 THEN SOUND 108,M

158 IF T=6 THEN SOUND 125, M

159 IF T=5 THEN SOUND 133, M

160 ZZ=Z-INT(Z/2)*2

162 IF T=3 THEN SOUND 147, M

163 IF T=2 THEN SOUND 159, M

164 IF T=1 THEN SOUND 170, M

166 IF T =4 THEN PRINT @ 8," KOL

AR'S DESIGNS ";:SOUND 176,M

167 FOR S = 1 TO 400: NEXT S

170 FOR J = A TO B STEP((A>B)*2+

1)*X

180 FOR K=AA TO BB STEP ((AA>BB)

*2+1)*Y

190 DN ZZ GOTO 200: RESET(J,K):G

DTD 210

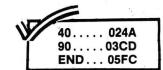
200 RESET(J,K)

205 SET(J,K,Y)

210 NEXT K, J: FOR P=1 TO 1000:NE

XT:60T0 120

Listing 3



10 '***SEE TAKING 'BASIC', SEPT.
'83. THIS INFO WAS OMITTED AND
ADDED TO GIVE YOU SOME PRACTICE
IN COPYING LISTINGS EXACTLY AND
TO HAVE A LITTLE FUN ADDING ANOTHER BIT OF INFO TO YOUR EXPANDING ARSENAL OF KNOWLEDGE.
20 CLS

30 PRINT@34, "TO UTILIZE THE 'IMA GINARY VERTICAL LINE' CONCEP T TO NEATLYALLIGN THE ROWS IN A PARAGRAPH, WHEN USING <PRINT@> S TATEMENTS, DO THE FOLLOWING: "
40 PRINT@226, "IT IS ASSUMED YOU WILL USE TWOSPACES TO INDENT THE FIRST WORD OF THE SENTENCE OR P ARAGRAPH. LINE LOCATION IS FOUND BY ADDING+2 TO THE FIRST PRINT@ SCREEN ROW LOCATION. (2ND R OW=32+2).

50 PRINT: INPUT" TO CONTINUE, PRE SS <ENTER>";01

60 CLS:PRINT@64+2,"YOU MAY USE < PRINT@32+2, > OR YOU MAY USE <PRINT@34. >.

70 PRINT@162, "DO NOT INCLUDE ANY SPACES BE- TWEEN THE FIRST QUOT E MARK AND THE FIRST LETTER OF THE SENTENCEOR PARAGRAPH."

80 PRINT:PRINT:INPUT" TO CONTINUE PRESS <ENTER("; 01

90 CLS:PRINT@34,"THE IMAGINARY L INE WILL BE UN-DER THE <,>. ALL FURTHER LINES IN THE PARAGRAPH WILL FALL UNDERTHE <,>.

100 PRINT@192+2, "REMEMBER, THE ONLY LOCATION NUMBERS YOU WILL USE TO FORMAT THE SENTENCE OR PARAGRAPH WITH ATWO SPACE INDENTATION WILL BE: 2; 34; 66; 98; 13 0; 162; 194; 226; 258; 290; 32 2; 354; 386; 418; 450; 482;"

110 PRINT: INPUT" TO CONTINUE PR ESS <ENTER>"; A1

120 CLS:PRINT@66, "NEARLY ALL THE PROGRAM LINES IN THIS TUTORIAL USE <PRINT@>. YOU MAY COMPARE THE LINES IN THELISTING WITH THE DISPLAY.

130 PRINT@226, "I THINK THAT I SH ALL NEVER SEEA POEM LOVELY AS A TREE OR A MAGAZINE AS GOOD AS 'THE RAIN- BOW' TO KEEP MY INT EREST IN THE COLOR COMPUTER FROM FLAGGING!"

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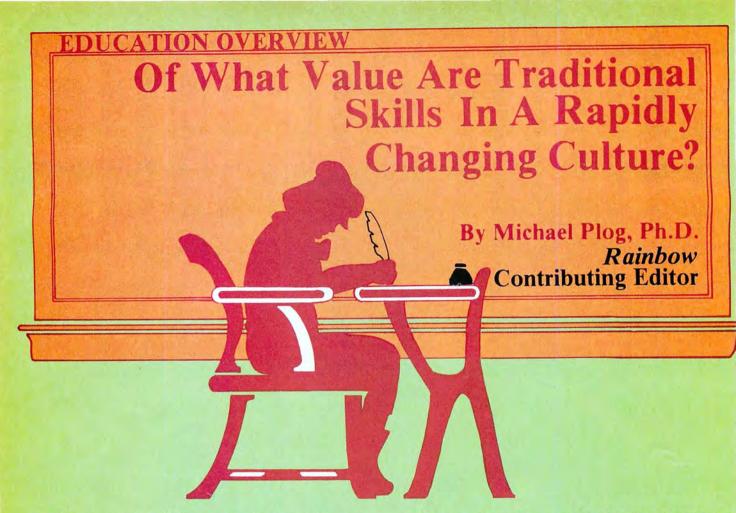


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FOR YOUR COLOR COMPUTER



The January issue! I know you will get this magazine before the end of December, so please let me take this opportunity to say Merry Christmas and Happy New Year. If you did not get something special for your Color Computer for Christmas, why not buy yourself a present? Now, let's get to a thought for this month's article.

Anytime a new technology is used in an educational setting, familiar arguments are pulled from ancient storage locations. When writing was first invented, many complained that it would ruin the memory of youth. With the advent of the typewriter, complaints about the loss of the art of penmanship were heard. Of course, the arguments were presented from the other side, also. What use is crowding the mind with all that information that can be written and reviewed anytime? What is the value of penmanship, especially if all that is needed is a signature at the bottom of a letter?

In modern times, the calculator has probably caused the greatest revival of this old argument, and the microcomputer will be next. One side will note the declining skills; the other side will ask the relevance of those skills.

This article is a response to a letter I received from Max James, whose questions are used throughout. I am indebted

(Michael Plog received his Ph.D. degree from the University of Illinois, the M.S. from Memphis State University, and the B.S. from the University of Tennessee. For his foreign/research language option required for the doctorate, he naturally selected computer language. Michael currently works for the Illinois State Board of Education as a research and evaluation specialist.)

to Mr. James for causing me to think hard about topics that can frankly be uncomfortable.

Mr. James asked for my comments to a few questions: If pocket calculators can perform all arithmetical operations, why should students spend time learning arithmetical skills? If an inexpensive microcomputer can solve algebra problems, why learn paper and pencil algebraic procedures? Is there any justification for continuing to teach archaic subjects, such as Roman numerals; square and cube root extractions; slide rule procedures; use of logarithms for multiplying, dividing, raising to powers, etc.

Now do not misjudge Mr. James. Max is not a simple malcontent. The man majored in math, minored in education, obtained a M.A. degree, and made a living as an electronics engineer and computer expert. The questions are important, and will be addressed in and out of the educational community for months to come. Mr. James only got to these questions before others did.

I must admit that my major was not math; I know a little about the subject, but am far from an expert. I think, however, the basic questions can be asked for any field of study, not simply mathematics.

For some questions discussed here, there is no justification, but a possible explanation. Teachers tend to teach what they know, and further, teach it the way they were taught. This causes a certain amount of inertia in curriculum, I will say that it is to the credit of American public schools that this inertia is not greater than it is. Some subjects (penmanship being one example) gradually fall from use and gently disappear. My aunts write beautifully; they had to pass penmanship when they were in school. My handwriting (we do not even call it penmanship anymore) is horrible; I used a typewriter in high school.

I imagine that some subjects, such as the use of a slide rule and cube root extractions, will follow the same path as penmanship, and gradually disappear from schools, except for those classes in the theory and history of mathematics.

There is more to this debate and sincere questioning, however, than inertia. The definition of "education" is based on expectations of society. Our current society places no value on ability to form tools from pieces of flint. Yet, in Neanderthal society, and even before, a young person's education would be incomplete without this skill. I can imagine an old stone knapper saying to a young, clumsy pupil, "Well, it may be functional. You can cut with it, but your lines show a lack of grace!" Yes, the stone tools were artistic as well as useful. Sort of like a teacher today telling a student, "Your program will do the job, but it could be done with greater ease (and, yes, beauty) if you used a FOR/NEXT loop here."

We likewise have no need of recognizing poison plants, like some cultures today making a living by hunting and gathering. We simply have little need in our world of know-

ing such things.

But, knowledge of some information is expected, and considered necessary by the majority of members of our society, to operating within the cultural structure. For example, arithmetic skills fall in this category. In some societies, of course, addition (which is really nothing more than counting) is not important. Number systems go something like, "One, two, three, many." Another example of knowledge considered essential in our society is elementary facts about an internal combustion engine. Even people who never drive know that a car needs gas and oil, and cannot be driven on a flat tire.

Every society I know of includes history as one of the major things to know. A sense of belonging to some larger structure (country, philosophy) may not be restricted to the human species, but is certainly present in the entire range of social structures on the planet today.

There are other "expected" skills and knowledge that must be mastered before members of a culture are willing to admit the young to adult status. We will not discuss all of

In the future, computer skills may be just as accepted and expected as math skills are now. At the moment, however, we are in transition. And societal transition takes a long time. The transition takes two forms. One group will speak of important things that are missing (but should not be) from schools. We are now seeing a wide range of people—not just computer nuts—discussing seriously the need for knowledge about computers for tomorrow's citizens. The second group of people are represented by the questions asked by Mr. James: Why are archaic topics so heavily present in schools?

Expectations of society is not totally the answer, but is the most powerful explanation I can offer. A person without the minimum elements of expected knowledge is hampered in almost all communication with other members of the culture. Naturally, in a pluralistic society such as ours, the expectations vary not only from one group to another, but among members of the same group. Schools have to fit the expectations of the major forces in the society, and please important minorities. At this particular time, the computer evangelist (I admit I fit this category) may be in a minority, but certainly growing in importance.

I may not have provided a justification for the questions asked by Mr. James. The explanation may be all there is; perhaps there is no reasonable justification. As an educator,

I accept certain principles as assumptions. In mathematics, there are several assumptions that cannot be proved, but have to be accepted in order for the entire field of study to work properly. Well, in a similar manner, I have certain assumptions about education.

An educated person is one who knows why things work. We (as a culture) need some people who know why arithmetic works, so the rest of us can use it. We need some people who know why computers work, so the rest of us can enjoy the use of our electronic tools. The more areas I know how things work, the less ignorant I am. It is the job of education (another assumption on my part) to reduce ignorance in as many areas as possible.

Mr. James, I hope this response at least partially addresses your questions. You have provided me with something to think about, and made me wonder and work a little. Thank

you for helping my education.

On to another topic, we owe congratulations to William Gattis. He has recently been promoted to Vice President, Radio Shack Education Division. Mr. Gattis helped implement the Tandy Educational Grants program (which has awarded about \$600,000 worth of products to non-profit institutions). He also designed and introduced the Tandy program offering BASIC and general introduction courses provided free to educators. Good job, Bill.

See you next month. Until then, keep on thinking about education.

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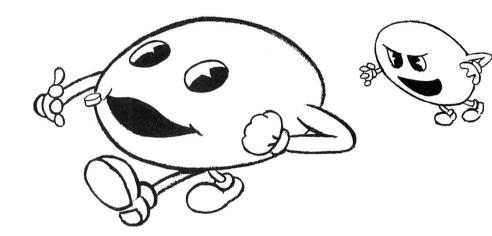
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Losing This Action 'Pac'ed' Game Is A Real 'Pill'

By Martin S. Montes



hort and sweet" is the old adage describing quick action with good results. Such is the case with this pill-swallowing game called *Pac 'Em*. The program is short and the game play is oh so sweet.

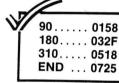
When typed in the 80C and RUN, the game provides you with a delectable platter of fuel pills. You are the large empty circle on the screen and your adversary is the large solid dot on the screen. Your objective is to eat all the pills on the screen by moving yourself over them using the four direction arrows. Avoid your adversary though, his only intent is to swallow you whole and end the game.

If you maneuver carefully and swallow all your pills, you get a fresh but larger screen of pills. As you eat the pills your fuel increases. The solid pills contain extra fuel but be sure you get to them before your foe does to enjoy their full potential. Your fuel is gauged by the solid bar on the bottom of the screen. Moving in any direction uses fuel. Running out of fuel ends the game.

If your enemy gets wise to your gobble pattern, leave some "nuke-poo" in his path to slow him down. The more nuke-poo you leave for him, the longer he stays paralyzed when he

(Martin S. Montes is a civil engineer working for the Army Corps of Engineers in Fort Worth. He currently heads a company called Assembly Lines Inc., a Dallas/Fort Worth firm that teaches individuals, in their own home or business, how to custom program their computers in BASIC.)

eats it. To dispense nuke-poo, merely press the space bar Note — leaving nuke-poo decreases your fuel.



The listing:

10 CLS:PMODE 4,1:PCLS:SCREEN 1,1 20 CLEAR: DIM P(20,20), K\$(4), B(20 ,20): POKE 65495.0 30 K\$(1)=CHR\$(9):K\$(2)=CHR\$(94): K\$(3)=CHR\$(8):K\$(4)=CHR\$(10) 40 X=8:Y=6:F=50 50 PCLS: IX=INT(256/(X+1)): IY=INT (182/(Y+1)) 60 LINE (3,3)-(252,3), PSET:LINE -(252,178),PSET:LINE -(3,178),PS ET:LINE -(3,3),PSET 70 LINE (20,182)-(20,190). PSET:L INE -(F,190), PSET: LINE -(F,182), PSET:LINE -(20,182), PSET: PAINT (21,185),1 80 DZ=2+(X+Y)/10 90 N=X*Y 100 FOR I=1 TO X:FOR J=1 TO Y:CI RCLE (IX*I, IY*J), 3:B(I, J)=0:IF R

LINE	DESCRIPTION		
10	Set up the high resolution mode	200	Eat all that pill's fuel, decrease fuel
20	K\$ array holds 4 arrow keys P matrix		gauge line by subroutine 210.
	holds fuel units gained for landing on	230	Get a key from the keyboard, if a space
	that spot.		bar then leave "nuke-poo" at your pres-
	B matrix holds "nuke-poo" units dis-		ent location (Increment B matrix).
lead to the con-	pensed at that spot.	240-270	Find out which arrow key was pressed.
30	Assign your arrow keys	280-310	Change present coordinates of yourself
40	Start with an 8 by 6 matrix & 50 fuel		and check for possible wraparound.
52 3 3 3 3 3	units.	320	Erase and redraw yourself at a new
50	Find out the pixel spacing between pills,		location.
No. Company	(X & Y)	330	Assign new pixel coordinate for enemy.
60	Draw screen border.	340	See if had any fuel under enemy (P
70	Draw fuel gauge strip.		Matrix)
80	Set dizziness factor for your opponent,	350	Find direction (+, - or 0) of enemy, rela-
	higher the DZ, the faster he moves.		tive to your position on the screen.
90	Find the starting number of pills.	360	See if your enemy swallowed too much
100	Draw a fresh screen of pills and give		"nuke-poo" and cannot move (GOTO
	some pills bonus fuel potential by let-		400)
	ting P matrix equal RND(23).	370	See if enemy moves towards you in the
120	Starting direction of your travel.		X direction.
130	Starting location of you (X0 & Y0) and	380	Or in the Y direction
	your opponent (X1 & Y1).	390	Give enemy his new pixel coordinates.
140	Make sure the starting distance between	400	Draw the enemy on the screen, fill him
	you and your opponent is not too close.		with white.
150	Draw both you and your opponent on	410	If any bonus fuel was under the enemy,
	the screen, paint your opponent a solid		reduce it to 1 fuel unit.
	white.	420	If your coordinates and your enemy's
160	Check if any fuel was gained on your		are the same, then you have been eaten.
	last jump.	430	See if enemy landed on some "nuke-
170	Increase fuel amount by number		poo", if so then decrease variable DZ,
	of fuel units in that pill, see if all pills		making him less active.
	have been eaten.	440	Make enemy a little more active,
180	Assign present location (in pixels) to		helps him recover from eating "nuke-
11	variables A & B.		poo."
190	Erase that fuel pill by painting it black.	450	Start next move.
1990		460	End the game and score.
	Contraction and the contraction of the contraction		

0,1ELSE P(I,J)=1:PLAY"L220;A" 110 NEXTJ, I 120 DX=0: DY=0 130 XO=RND(X):YO=RND(Y):X1=RND(X):Y1=RND(Y) 140 IF ABS(X0-X1)<4 OR ABS(Y0-Y1)<4 THEN 130 150 CIRCLE (XO*IX, YO*IY), 6: CIRCL E (X1*IX, Y1*IY), 7: PAINT (X1*IX+4 ,Y1*IY),1:PAINT (X1*IX+4,Y1*IY), 0 160 IF P(XO, YO)=0 THEN 180 170 FOR I=1 TO P(XO, YO):PLAY "L1 70; "+STR\$(INT(I/2+1)):F=F+1:LINE (F, 182) - (F, 190), PSET: NEXT I: T=T+ P(XO, YO): N=N-1: IF N=O THEN X=X+1 :Y=Y+1:GOTO 50 180 A=X0*IX:B=Y0*IY 190 IF P(XO, YO) <>O THEN PAINT (A ,B),1: PAINT (A,B),0

ND(X+Y)=1 THEN P(I,J)=RND(23):PA

INT (IX*I, IY*J), 1:SOUND P(I, J)*1

200 P(XO, YO)=0:GOSUB 210:GOTO220 210 LINE (F, 182) - (F, 190), PRESET: F=F-1:PLAY"L150; C": IF F=19 THEN PRINT@170, "OUT OF FUEL": GOTO 460 ELSE RETURN 220 REM 230 A\$=INKEY\$: IF A\$=" " THEN B(X 0, Y0) =B(X0, Y0) +3: PLAY"V30; L200; D 1; G": PSET (A+RND (5) -3, B+RND (5) -3) :GOSUB 210:GOTO 230 ELSE IF A\$=" " THEN 280 240 IF A\$=K\$(1) THEN DX=1:DY=0:G OTO 280 250 IF A\$=K\$(2) THEN DY=-1:DX=0: **GOTO 280** 260 IF A\$=K\$(3) THEN DX=-1:DY=0: **GOTO 280** 270 IF A\$=K\$(4) THEN DY=1:DX=0 280 XO=XO+DX: IF XO=O THEN XO=X 290 IF XO>X THEN XO=1 300 YO=YO+DY: IF YO=O THEN YO=Y 310 IF YO>Y THEN YO=1

320 CIRCLE (A,B),6,0:CIRCLE (XO* IX, YO*IY), 6 330 A=X1*IX:B=Y1*IY:PAINT (A+4.B 340 IF P(X1,Y1)<>0 THEN CIRCLE (A.B).3 350 EX=SGN(XO-X1):EY=SGN(YO-Y1) 360 IF RND(DZ)<=1 THEN 400 370 IF RND(2)=1 THEN IF X1+EX>0 AND X1+EX<=X THEN X1=X1+EX:GOTO 390 380 IF Y1+EY>O AND Y1+EY<=Y THEN Y1=Y1+EY 390 A=X1*IX:B=Y1*IY 400 CIRCLE (A,B),7:PAINT (A+4,B) 410 IF P(X1, Y1)>0 THEN P(X1, Y1)= 420 IF X1=X0 AND Y1=Y0 THEN FOR I=1 TO 1000:NEXT I:PRINT@266, "SO RRY....":SOUND 1,30: GOTO 460 430 IF B(X1,Y1)<>O THEN FOR I=1 TO B(X1, Y1) *4: PLAY"L200; A": NEXTI :DZ=DZ/B(X1,Y1):B(X1,Y1)=0 440 DZ=DZ+.1 450 GOTO 160 460 PRINT@325, "YOU SCORE"T"POINT S!!!"

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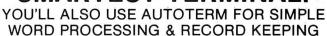
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ould you like another 8K of memory available from Extended BASIC? This machine language utility program relocates BASIC and Extended BASIC into the 64K RAM chips. Once this is done you have the choice of regular 32K or 40K RAM, Map 1.

This program will only work on a computer with the completed 64K upgrade and I don't think it will work with a disk system. The famous speed up (*POKE* 65495,0) will not work.

All BASIC and Extended BASIC commands will function normally; however, some machine language programs may crash. The only way to tell is to try them.

32K Extended BASIC Mode

If you choose the 32K mode, all BASIC and most, if not all, machine language programs will run as normal. Since the ROMs are now in RAM they can be altered. As an example, try POKEing different values into memory location 41384. This has an effect on the cursor. You might also try POKEing values into 41805 and then listing a program. You will find the screen scroll has been altered. Some commands have already been changed by the utility, more on this later. The 32K mode can be useful for making backup copies of ROM Packs since this area is also copied to the 64K chips.

40K Extended BASIC Mode

When this option is chosen, Extended BASIC is moved to high RAM starting at 57088 and ending at 65279. This still leaves the memory from 49152 to 57087 free for your own machine language utility use. BASIC RAM work-space now ends at 40960. This utility program changes all of the ROM's long branches, jumps, and tables to correspond to its new location. When you PRINT MEM, you will get a value of 33063, and after a PCLEAR I command you should have 37671 bytes available. These values are 8192 bytes larger than normal, reflecting the new BASIC RAM work space. Some BASIC programs will have to be modified to utilize this

(For the past 17 years, Ray has been involved in the performing and visual arts as a professional musician and a studio potter. Three years ago he caught the computer bug and is now taking a computer engineering course at Sault College.)

additional memory, this usually means changing the CLEAR command by 8192.

Command Changes

The utility is set up to make three changes to the BASIC ROM routines. The first allows you to use the PCLEAR 0 command. This keeps the BASIC program buffer intact and causes free memory to increase to 39207. If you then CLEAR 0 you get another 200 bytes for a total of 39407, almost 40K. It should be noted that with the first graphics page now available for program storage, a PCLS statement, or for that matter any Hi-Res graphics command, will destroy your BASIC program. For this reason, this statement is most useful for database and non-hi-resolution graphic programs. The CLOAD command has been altered slightly. When an I/O error is encountered, the audio is no longer turned off automatically. This is to allow easier tape searches. The last change made to BASIC is in the working of the trace function, TRON. I have replaced the square brackets "[]" with minus signs "-". This change makes the reading of a trace much easier.

Machine Language Utility

This program was written using Radio Shack's excellent EDTASM+ ROM Pak. You should be able to enter the code (Listing 1) with other editor/assemblers as long as they use standard 6809 mnemonics and assembler directives. The program originates at 31744, but can be re-assembled to any location that you wish. This code is not position independent. Save the source code for further reference and the assembled code for immediate use. Be sure there are no errors or omissions. A small error could go unnoticed and cause problems later. For those without assemblers, enter the BASIC code (Listing 2) and run it. Follow the instructions for saving the completed ML code. This is what you will later CLOADM and EXEC. When the utility is executed, any BASIC programs in memory are deleted, as this is the same as a cold start power up.

Listing 1:

7C00 00100 ORG \$7C00 7C00 BD A928 00200 CLS JSR \$A928

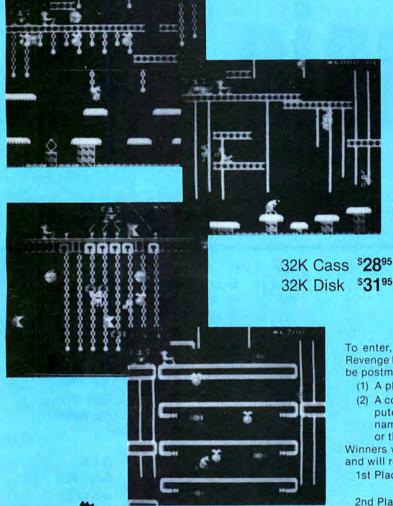


For Basic

e 8 9

50 8000 84 FFDF 81 FFDE FEFE F1 FFDF 1212 968F 9683	00400 00500	7C4B AD 9F A002 04200 JSR [\$A002] 7C4F 20 F6 04300 BRA PQUE 7C51 AD 9F A000 04400 GETA JSR [\$A000] 7C55 27 FA 04500 BEQ GETA 7C57 BD A92B 04600 JSR \$A92B 7C5A B1 31 04700 CMPA #\$31 7C5C 27 0C 04800 BEQ FKRAM 7C5E B1 32 04900 CMPA #\$32 7C60 26 E1 05000 BNE RAMRAM 05100 *32K JUMP 05200 7C62 BE 0000 05300 LDX \$\$0 7C65 1C AF 05400 ANDCC #\$AF
8000 84 7 FFDF 81 7 FFDE FEFE F1 FFDF	00500	7C51 AD 9F A000 04400 GETA JSR [\$A000] 7C55 27 FA 04500 BEQ GETA 7C57 BD A928 04600 JSR \$A928 7C5A 81 31 04700 CMPA \$\$31 7C5C 27 0C 04800 BEQ FKRAM 7C5E 81 32 04900 CMPA \$\$32 7C60 26 E1 05000 BNE RAMRAM 05100 *32K JUMP 05200 7C62 BE 0000 05300 LDX \$\$60
8000 84 7 FFDF 81 7 FFDE FEFE F1 FFDF	00600 LDX \$\$8000 00700 ROMV LDD ,X 00800 STA \$0FFDF 00900 STD ,X++ 01000 STA \$0FFDE 01100 CMPX \$\$0FFDE 01200 BNE ROMV 01300 STA \$0FFDF 01400 *SET TO ALLOW PCLEARO 01500 01600 LDD \$\$1212	7C55 27 FA 04500 BEQ GETA 7C57 BD A928 04600 JSR \$A928 7C5A B1 31 04700 CMPA #\$31 7C5C 27 0C 04800 BEQ FKRAM 7C5E B1 32 04900 CMPA #\$32 7C60 26 E1 05000 BNE RAMRAM 05100 *32K JUMP 05200 7C62 BE 0000 05300 LDX \$\$0
84 FFDF 81 FFDE FEFE F1 FFDF	00700 ROMV LDD ,X 00800 STA \$0FFDF 00900 STD ,X++ 01000 STA \$0FFDE 01100 CMPX #\$0FEFE 01200 BNE ROMV 01300 STA \$0FFDF 01400 *SET TO ALLOW PCLEARO 01500 01600 LDD \$\$1212	7C57 BD A928 04600 JSR \$A928 7C5A B1 31 04700 CMPA #\$31 7C5C 27 0C 04800 BEQ FKRAM 7C5E B1 32 04900 CMPA #\$32 7C60 26 E1 05000 BNE RAMRAM 05100 *32K JUMP 05200 7C62 BE 0000 05300 LDX \$\$0
FFDF 81 FFDE FEFE F1 FFDF 1212 968F	00800 STA \$0FFDF 00900 STD ,X++ 01000 STA \$0FFDE 01100 CMPX #\$0FFEE 01200 BNE ROMV 01300 STA \$0FFDF 01400 *SET TO ALLOW PCLEARO 01500 01600 LDD \$\$1212	7C5A 81 31 04700 CMPA #\$31 7C5C 27 0C 04800 BEQ FKRAM 7C5E 81 32 04900 CMPA #\$32 7C60 26 E1 05000 BNE RAMRAM 05100 *32K JUMP 05200 7C62 BE 0000 05300 LDX \$\$0
81 FFDE FEFE F1 FFDF	00900 STD ,X++ 01000 STA \$0FFDE 01100 CMPX #\$0FEFE 01200 BNE ROMV 01300 STA \$0FFDF 01400 *SET TO ALLOW PCLEARO 01500 01600 LDD \$\$1212	7C5C 27 0C 04800 BEQ FKRAM 7C5E 81 32 04900 CMPA #\$32 7C60 26 E1 05000 BNE RAMRAM 05100 *32K JUMP 05200 7C62 BE 0000 05300 LDX \$\$0
FFDE FEFE F1 FFDF 1212 968F	01000 STA \$0FFDE 01100 CMPX #\$0FEFE 01200 BNE ROMV 01300 STA \$0FFDF 01400 *SET TO ALLOW PCLEARO 01500 01600 LDD \$\$1212	7C5E 81 32 04900 CMPA #\$32 7C60 26 E1 05000 BNE RAMRAM 05100 *32K JUMP 05200 7C62 BE 0000 05300 LDX \$\$0
FEFE F1 FFDF 1212 968F	01100 CMPX #\$0FEFE 01200 BNE ROMV 01300 STA \$0FFDF 01400 *SET TO ALLOW PCLEARO 01500 01600 LDD \$\$1212	7C60 26 E1 05000 BNE RAMRAM 05100 *32K JUMP 05200 7C62 BE 0000 05300 LDX *\$0
F1 FFDF 1212 968F	01200 BNE ROMV 01300 STA \$0FFDF 01400 *SET TO ALLOW PCLEARO 01500 01600 LDD \$\$1212	05100 *32K JUMP 05200 7C62 BE 0000 05300 LDX \$\$0
FFDF 1212 968F	01300 STA \$0FFDF 01400 *SET TO ALLOW PCLEARO 01500 01600 LDD \$\$1212	05200 7C62 BE 0000 05300 LDX \$\$0
1212 968F	01400 *SET TO ALLOW PCLEAR0 01500 01600 LDD \$\$1212	7C62 BE 0000 05300 LDX \$\$0
968F	01500 01600 LDD \$\$1212	
968F	01600 LDD #\$1212	7C65 1C AF 05400 ANDCC #\$AF
968F		
	01700 STD \$968F	7C67 7E 8002 05500 JMP \$8002
	01800 STD \$96A3	05600 *40K LOOP TO RELOCATE RAM
96A5	01900 STD \$96A5	7C6A 8E 3430 05700 FKRAM LDX #\$3430
, ,,,,,	02000 *DISABLE AUDIOOFF ON ER	R 7C5D BF 80EB 05800 STX \$80EB
	02100	7C70 BE 8000 05900 LDX #\$8000
D AC4F	02200 STD \$AC4F	7C73 108E DF00 06000 LDY #\$DF00
7 AC51	02300 STA \$AC51	7C77 EC 84 06100 MLDDP LDD ,X
	02400 *CHANGE TRON [] TO -	7C79 6F 81 06200 CLR , X++
	02500	7C7B ED A1 06300 STD ,Y++
6 2D	02500 LDA #\$2D	7C7D 8C A000 06400 CMPX #\$A000
7 82E3	02700 STA \$82E3	7C80 26 F5 06500 BNE MLOOP
		06600 *RESET 2 DISPATCH TABLES
, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		G 06700
		7C82 8E E0F0 06800 DISPT1 LDX #\$0E0F0
7007		7C85 A6 84 06900 DLOOP1 LDA ,X
		7C87 8B 5F 07000 ADDA #\$5F
		7C89 A7 81 07100 STA ,X++
		7C8B 8C E11E 07200 CMPX #\$0E11E
		7C8E 26 F5 07300 BNE DLOOP1
		7C90 8E E157 07400 DISPT2 LDX #\$0E157
		7C93 A6 B4 07500 DLODP2 LDA ,X
		7C95 8B 5F 07600 ADDA #\$5F
00E 7E2A		7C97 A7 B1 07700 STA ,X++
VOC / CZH		7C99 BC E173 07B00 CMPX #\$0E173
7 E 0 5 7 7 0	7DD7 8E 80E8 80 04 A0	82ED 02800 STA \$82ED 02900 *CHANGE EX-BASIC HEADIN 03000 7DD7 03100 LDX *MESSG 8E 80E8 03200 LDY *\$80E8 80 03300 CHEAD LDA ,X+ 04 03400 BEG RAMRAM A0 03500 STA ,Y+ F8 03600 BRA CHEAD 03700 *DECIDE DN 32K OR 40K 03800 8E 7E2A 03900 RAMRAM LDY *BUEST

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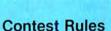
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7C9C 26 F5			BNE DLOOP2
	08000	*MAIN T	O CHNG ADDRESSES
	08100		
7C9E BE DF0		CHNG	LDX #\$DF00
7CA1 108E 7D3	3 08300		LDY #LIST
7CA5 A6 80	08400	CLOOP	LDA , X+
7CA7 81 BE	08500		CMPA #\$8E
7CA9 27 2B	08600		BEQ INIT
7CAB 81 BD	08700		CMPA #\$OBD
7CAD 27 27	08800		BEQ INIT
7CAF 81 CE	08900		CMPA #\$OCE
7CB1 27 23	09000		BEQ INIT
7CB3 B1 7E	09100		CMPA #\$7E
7CB5 27 1F	09200		BEQ INIT
7CB7 81 11	09300		CMPA #\$11
7CB9 27 15	09400		BEQ SPECL
7CBB 8C FEF		COMMON	CMPX #\$FEFF
7CBE 27 OE	09600	COINIDIA	BEQ ENDPRT
7CCO AC A4	09700		CMPX ,Y
7CC2 26 E1	07700		BNE CLOOP
7CC4 31 22			LEAY 2, Y
	09900		
7CC6 30 B4	10000		LEAX [,Y]
7CC8 31 22	10100		LEAY 2, Y
7CCA 30 01	10200		LEAX 1,X
7CCC 20 D7	10300		BRA CLOOP
7CCE 20 16			BRA LONBR
		*SPECIAL	CASES
	10600		
7CD0 A6 80	10700	SPECL	LDA ,X+
7CD2 81 83	10800		CMPA #\$83
7CD4 26 E5	10900		BNE COMMON
7CD6 A6 84	11000	INIT	LDA , X
7CD8 81 80	11100		CMPA #\$80
7CDA 25 DF	11200		BLO COMMON
7CDC B1 9F	11300		CMPA #\$9F
7CDE 22 DB	11400		BHI COMMON
7CE0 8B 5F	11500		ADDA #\$5F
7CE2 A7 81	11600		STA , X++
7CE4 20 D5	11700		BRA COMMON
			ONG BR OFFSETS
	11900		United the s
7CE6 8E 7D5		LONBR	LDX #LTABLE
7CE9 86 5F	12100	LONDIN	LDA #\$5F
7CEB B7 7D3			STA TEMPO
7CEE 70 7D3			NEG TEMPO
7CF1 A6 94		LBROOP	LDA [,X]
		LDRUUF	ADDA TEMPO
7CF3 BB 7D3:			
7CF6 A7 94	12600		STA [,X]
7CF8 30 02	12700		LEAX 2,X
7CFA 8C 7DA			CMPX #2+MIDTBL
7CFD 27 EF	12900		BEQ NEG
7CFF 8C 7DD			CMPX #2+ENDTBL
7D02 26 ED	13100		BNE LBROOP
		*MOP UP	A000 BASIC ROM
	13300		
7D04 BE AOD	1 13400		LDX #\$AOD1
7D07 86 7E	13500		LDA #\$7E
7D09 A7 80	13600		STA ,X+
7DOB CC DFO	2 13700		LDD #\$ODF02
7D0E ED 84	13800		STD , X

7D10 86	9F	13900 LDA #\$9F
7D12 B7	BC85	14000 STA \$BC85
7015 8E	A084	14100 LDX #\$A084
7018 CC	8E9F	14200 LDD #\$8E9F
7D1B ED	81	14300 STD , X++
7DID CC	FE7E	14400 LDD #\$FE7E
7D20 ED	81	14500 STD , X++
7022 CC	A093	14600 LDD #\$A093
7D25 ED	84	14700 STD , X
7027 4F		14800 CLRA
7028 97	71	14900 STA \$71
		15000 *40K JUMP
		15100
702A 8E	0000	15200 LDX #\$0
7D2D 1C	AF	15300 ANDCC #\$AF
7D2F 7E	A027	15400 JMP \$A027
		15500
		15600 *MAIN PROGRAM END IS HERE
		15700
7D32		15800 TEMPO RMB \$01
		15900 *LIST OF AREAS TO SKIPP
		16000
7033	DFDA	16100 LIST FDB \$0DFDA
7035	E038	16200 FDB \$0E03B
7037	E083	16300 FDB \$0E083
7D39	E173	16400 FDB \$0E173
7D3B	E2AB	16500 FDB \$0E2AB
7D3D	E346	16600 FDB \$0E346
7D3F	E304	16700 FDB \$0E3C4
7D41	E3F1	16800 FDB \$0E3F1

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7D45	E80F	17000	FDB \$0E80F	701	B5	F38A	23000		FDB	\$0F38A
7047	FIDD	17100	FDB \$0F1DD	701	B7	F38C	23100		FDB	\$0F38C
7D49	F1E5	17200	FDB \$0F1E5	7DI	B9	F38E	23200		FDB	\$0F38E
7D4B	F606	17300	FDB \$0F606	701		F390	23300			\$0F390
7D4D	F60E	17400	FDB \$0F60E	7DI		F392	23400			\$0F392
7D4F	FB5B	17500	FDB \$0FB5B	701		E37B	23500			\$0E37B
7051	FBB6	17600	FDB \$0FBB6	700		F739	23600			\$0F739
7053	FD79	17700	FDB \$OFD79	700		F73B	23700			\$0F73B
7055	FDA0	17800	FDB \$OFDAO	700		F73E	23800			\$0F73E
7057	FEFF	17900	FDB \$0FEFF	700		F740	23900			\$0F740
			OF LONG BRANCHES	700		F743	24000			\$0F743
7050	DEAC	18100	CAD +DEAC	700		F745	24100			\$0F745
7059	DFAE	18200 LTABLE	FDB \$DFAE	700		F748	24200			\$0F748
705B	EOFA	18300	FDB \$EOFA	7D		F74A	24300			\$0F74A
7050 705F	E220	18400	FDB \$E220	701		F74D	24400			\$0F74D
	E232	18500	FDB \$E232	701		F74F	24500			\$0F74F
7D61	E24F	18600	FDB \$E24F	701	05	FC11	24600	¥		\$0FC11
7D63 7D65	E29E E34B	18700	FDB \$E29E					*THINGS	FOR	THE SCREEN
7063 7067	E379	18800	FDB \$E34B				24800			
7D69	E3C1	18900 19000	FDB \$E379 FDB \$E3C1	70)		33	24900	MESS6	FCC	/32K ROM-RAM/
7D6B	E441	19100	FDB \$E441	7DE		ODOD	25000		FDB	\$ODOD
7D6D	E4FC	19200	FDB \$E4FC	701	E4	56	25100		FCC	/VERSION 1.1 1983 BY
706F	E704	19300	FDB \$E704							RAY GAUVREAU/
7D71	E73A	19400	FDB \$E73A	7E(04	45	25200		FCC	/EXTENDED BASIC /
7073	E7EA	19500	FDB \$E7EA	7E	14	OD	25300		FCB	\$0D
7 0 75	E872	19600	FDB \$E872	7E	15	4E	25400		FCC	/NOW IN 64K RAM MODE/
7977	EB40	19700	FDB \$EB40	7E:	28	OD	25500		FCB	\$0D
7079	EB68	19800	FDB \$EB68	7E	29	00	25600		FCB	\$0
7D7B	EB79	19900	FDB \$EB79	7E:	2A	50	25700	QUEST		/PRESS 1 FOR 40K
7D7D	EBAF	20000	FDB \$EBAF							2 FOR 32K/
7D7F	EBE8	20100	FDB \$EBE8	7E4	ΔΔ	00	25800	FINS	FCB	
7D81	EC8B	20200	FDB \$EC8B	/-		0000	25900		END	"/
7D83	EEA9	20300	FDB \$EEA9						V	
7085	F220	20400	FDB \$F220							11001FA
7087	F293	20500	FDB \$F293	Ψ.		-11			- 1	180 05E3 END 0838
7D89	F2E4	20600	FDB \$F2E4	L	isting 2	:			L	
7D8B	F314	20700	FDB \$F314	10	O CLS	:PRIN	IT" C	ONE M	OME	ENT PLEASE"
7D8D	F31A	20800	FDB \$F31A			6=31				
708F	F35C	20900	FDB \$F35C	30	O REA	D P\$:	P=VA	4L ("&	H"-	+P\$)
7091	F461	21000	FDB \$F461			NT@32				
7093	F7DB	21100	FDB \$F7DB			E G,F	•			
7D95	F8C8	21200	FDB \$F8C8			T G:C				
7097	F8D5	21300	FDB \$F8D5	60	O PRI	NT"NC	W TO	SAV	E	THE PROGRAM
7D99	F941	21400	FDB \$F941	a -	TYPE"	1				9
709B	F9D8	21500	FDB \$F9DB	70	O PRI	NT"CS	AVEN	1" ; CH	R\$	(34); "FORTY
7D9D	FB45	21600	FDB \$FB45	K'	" ; CHF	(34)	, ", 3	1744	, 32	2330,31744"
709F	FE03	21700	FDB \$FE03	80	O PRI	NT"TO	RUN	IT	TYF	PE EXEC317
7DA1	FE3F	21800 MIDTBL		44	4"					<i>⊕</i> * 0
			TO BE INCREASED			TA IN				
		22000		10	OO DA	TABD,	A9,2	28, 1A	, 50	0,8E,80,00,
7DA3	DFDF	22100	FDB \$ODFDF	E	C,84,	B7,FF	,DF,	ED,8	1 , E	37,FF,DE,8C
7DA5	DFE1	22200	FDB \$ODFE1				-			CC, 12, 12, F
7DA7	DFE6	22300	FDB \$ODFE6							6, A5, FD, AC,
7DA9	DFE4	22400	FDB \$ODFE4							32,E3,B7,82
7DAB	F19C	22500	FDB \$0F19C							E8,A6,80,2
7DAD	F19E	22600	FDB \$0F19E							E,7E,2A,A6,
7DAF	F1A0	22700	FDB \$0F1A0			06,AD	, 9F,	A0,0	2,2	20
7DB1	F1A2	22800	FDB \$0F1A2	1 1	10 '					
										i i

120 DATAF6, AD, 9F, AO, OO, 27, FA, BD, A9, 28, 81, 31, 27, OC, 81, 32, 26, E1, 8E, OO, OO, 1C, AF, 7E, 80, O2, 8E, 34, 30, BF, 80, E8, 8E, 80, OO, 10, 8E, DF, OO, EC, 84, 6F, 81, ED, A1, 8C, AO, OO, 26, F5, 8E, E0, FO, A6, 84, 8B, 5F, A7, 81, 8C, E1, 1 E, 26, F5, 8E, E1, 57, A6, 84, 8B, 5F, A7, 81, 8C, E1, 73, 26, F5, 8E, DF 130 '

140 DATAOO, 10, 8E, 7D, 33, A6, 80, 81, 8E, 27, 2B, 81, BD, 27, 27, 81, CE, 27, 23, 81, 7E, 27, 1F, 81, 11, 27, 15, 8C, FE, F, 27, 0E, AC, A4, 26, E1, 31, 22, 30, B4, 31, 22, 30, 01, 20, D7, 20, 16, A6, 80, 81, 83, 26, E5, A6, 84, 81, 80, 25, DF, 81, 9 F, 22, DB, 8B, 5F, A7, 81, 20, D5, 8E, 7D, 59, 86, 5F, B7, 7D, 32, 70, 7D

160 DATA32,A6,94,BB,7D,32,A7,94,30,02,8C,7D,A3,27,EF,8C,7D,D7,26,ED,8E,A0,D1,86,7E,A7,80,CC,DF,02,ED,84,86,9F,B7,BC,85,8E,A0,84,CC,8E,9F,ED,81,CC,FE,7E,ED,81,CC,A0,93,ED,84,4F,97,71,8E,00,00,1C,AF,7E,A0,27,00,DF,DA,E0,3B,E0,83,E1,73,E2,AB,E3,46,E3

180 DATAC4,E3,F1,E8,OB,E8,OF,F1,DD,F1,E5,F6,O6,F6,OE,FB,5B,FB,B6,FD,79,FD,AO,FE,FF,DF,AE,E0,FA,E2,20,E2,32,E2,4F,E2,9E,E3,4B,E3,79,E3,C1,E4,41,E4,FC,E7,O4,E7,3A,E7,EA,E8,72,EB,4O,EB,68,EB,79,EB,AF,EB,E8,EC,8B,EE,A9,F2,2O,F2,93,F2,E4,F3,14,F3,1A,F3

200 DATA5C,F4,61,F7,DB,F8,C8,F8,D5,F9,41,F9,D8,FB,45,FE,03,FE,3F,DF,DF,DF,E1,DF,E6,DF,E4,F1,9C,F1,9E,F1,A0,F1,A2,F1,A4,F3,8A,F3,8C,F3,8E,F3,90,F3,92,E3,7B,F7,39,F7,3B,F7,3E,F7,40,F7,43,F7,45,F7,48,F7,4A,F7,4D,F7,4F,FC,11,33,32,4B,20,52,4F,4D,2D,52

220 DATA41, 4D, 0D, 0D, 56, 45, 52, 53, 49, 4F, 4E, 20, 31, 2E, 31, 20, 31, 39, 38, 33, 20, 42, 59, 20, 52, 41, 59, 20, 47, 41, 55, 56, 52, 45, 41, 55, 45, 58, 54, 45, 4E, 44, 45, 44, 20, 42, 41, 53, 49, 43, 20, 20, 0D, 4E, 4F, 57, 20, 49, 4E, 20, 36, 34, 4B, 20, 52, 41, 4D, 20, 4D, 4F, 44, 45, 0D, 00, 50, 52, 45, 53, 53, 20, 230, 3

240 DATA20,20,31,20,20,46,4F,52, 20,34,30,4B,20,20,20,32,20,20,46,4F,52,20,33,32,4B,00

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BOLOR-EVED-O-SGOPE

By Terrell Touchstone

ere you as disappointed as I in the kaleidoscope program in Getting Started With Color BASIC? And in the other pattern programs that have appeared from time to time? Here is one that I think you will find more dynamically faithful to the ole' kaleidoscope. And while this endless display of colorful patterns demonstrates the Color Computer's capabilities, it can also be quite practical. For one thing, the display is an excellent attention getter for store windows and selling booths. Secondly, if it is necessary for you to leave your monitor or TV set on and unattended for long periods of time, this program will be useful in preventing "burn-in" on your tube.

The program is elementary. It uses the SET statement to randomly place a pair of mirror-image color blocks in each of four quadrants. What makes the patterns interesting to watch is the manner in which the RND function is orchestrated to select color, duration and foldback of the pattern streamers. You might try playing with the RND statements in Lines 100, 221 and 300 to get different dynamics.

As it is, the code will run on any Color Computer beginning with 4K Color BASIC, and it is easily adapted to any

(Terrell Touchstone has a Ph.D. in chemical engineering and fifteen years of experience in the field of computer process control. He is currently employed with Chevron in Richmond, California)

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SUNSHINE SOFTWARE, P.O. BOX 15686 PANAMA CITY, FL 32406 other machine. To try it, simply type it in and RUN. To increase the speed, try the POKE 65495,0. Don't fail to step back and view it from across the room.

The listing:

1 ' ### COLOR-EYED-O-SCOPE ###

2 ' BY TERRELL TOUCHSTONE 3 '

4 ' INITIALIZE

20 CLSO

30 D1=0:D3=1:D4=1

40 A=RND(4):B=RND(10)

50 GOT0225

90 ' MAIN LOOP

100 IF RND(0)>.6 GOTO 210

208 DA=RND(2): DB=RND(3)

210 A=A-DA+D3:B=B-DB+D4

221 IF RND(0)>.2 GOTO 230

225 CL=RND(8)

230 IF ABS(A)>15 OR ABS(B)>15 OR

D1>8 GOTO 300

232 IF ABS(A) <= 12 GOTO 235

233 D3=-D3:D1=D1+1

235 IF ABS(B) > 12 THEN D4=-D4

250 SET(31+2*A,15+B,CL)

255 SET (31+2*A, 15-B, CL)

260 SET(31-2*A,15-B,CL)

265 SET (31-2*A, 15+B, CL)

270 SET (31+2*B, 15+A, CL)

275 SET (31+2*B, 15-A, CL)

280 SET (31-2*B, 15-A, CL)

285 SET (31-2*B, 15+A, CL)

290 GOTO 100

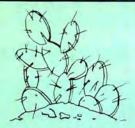
300 IF RND(3)>1 GOTO 30

320 FOR K=1 TO 4000:NEXT K

330 CLSO

350 GOTO 30





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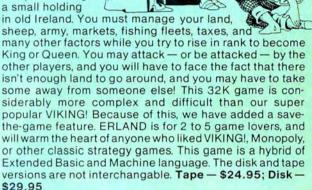
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This program demonstrates the dramatic effects which can be achieved on the CoCo by rapid high resolution screen switching. The program utilizes the high speed POKE 65495,0 and normal speed POKE 65494,0 to speed up the plotting of the 3-D sine wave. Let's take a look at how the program uses some of the CoCo's graphics commands.

The PCLEAR8 statement in Line 730 reserves all eight of the 1536-byte graphics memory pages. The placement of this statement at the end of the program may seem somewhat odd. The program runs from Line 60 to the PCLEAR8 in Line 730 and then back to Line 70 via GOTO statements. This odd arrangement is good programming practice due to an obscure error in the 1.0 Extended BASIC ROM. A valid PCLEAR statement placed in the early part of a program may produce an error message or program halt if your program exceeds a certain length. This erroneous error message is avoided by the above practice. The program graphics setup gets underway in Line 50 which specifies *PMODE4*, 1. This high resolution *PMODE4* (256 x 192 graphics grid) requires four of the 1536-byte graphics memory pages for a full screen display. Thus with PCLEAR8 and PMODE4, you have two full screen displays available. The first screen starts on Page 1 (PMODE4,1) and the second screen starts on Page 5 (PMODE4,5). Remember that the PMODE statement takes the form PMODE (resolution mode, start page).

After you have set up your PMODE and set aside the needed number of graphics pages with PCLEAR, a PCLS statement (as in Line 70) will clear the screen of any garbage or unwanted graphics in the current screen video RAM pages. The SCREEN1,1 statement in Line 70 tells the computer you want to show a graphics screen rather than the prior text screen, and you want the screen to be black and buff. Remember that a SCREEN statement takes the form

SCREEN (type, color set).

At this point, we have set the stage, and the real program action begins. Lines 80 through 140 use the scale function available in the DRAW statement to create a changing scale cube. Notice that the scale value must be converted from a numeric expression to a character string expression through the STR\$ function in order to be accepted by the DRAW statement. The scale function in the DRAW statement will not affect or scale parts of graphics put on the screen through other graphics statements, such as LINE or CIR-CLE.

Lines 160 through 240 open the cube. Lines 250 through 290 create the explosive transformation. Lines 330 through 410 create the ultimate power device (an illusion). Lines 420 through 580 plot the 3-D sine wave. The most dramatic graphic effects of the program are created by the high speed screen switching produced in Lines 660 through 700. Everything really comes apart!

When you run this program, notice how various tech-

niques to display the graphics are used.

In some cases, the graphics are drawn on the screen while you are watching. In other cases, the graphics are drawn on pages not currently shown, and then brought to the screen after the graphics are complete. In the case of the 3-D sine wave, the first wave is plotted while the prior screen is displayed, but the remaining waves are plotted while you

(David Sligar has published a graphics program for a mainframe, but is presenty working on a financial analysis program for construction contractors for the CoCo. His hobbies include writing software.)

watch. How and when your graphics are brought to the screen depends on your placement of PMODE and SCREEN statements within your programs.

NOTE: If you add spaces when you type this program, it will not fit in 16K.

130 0150 280 02B6 390 0512 570....066B END ... 0824 The listing: 10 CLS4: PRINT@128, "COLOR CAD" 15 PRINT@224, "THE IMPOSSIBLE OBJ ECT" 20 PRINT@320, "BY DAVID SLIGAR":F ORX=1T0999: NEXTX 30 CLS3: PRINT@192, "GOOD THINGS... 40 PRINT@256, "COME IN SMALL BOXE S":FORX=1T0999:NEXTX 50 PMODE4, 1 60 GOT0730 70 PCLSO: SCREEN1, 1 80 FORZ=1TO8 90 IF Z=8 THEN FORZ=8TO4 STEP-1 100 PCLSO 110 S\$="S"+STR\$(Z)+";" 120 DRAW S\$+"; BM100, 100U30NR30E1 5R30NG15D30G15NU30L30" 130 FORX=1T0120: NEXTX 140 NEXTZ 150 FORX=1T0400: NEXTX 160 PCLS:DRAW"BM100,100U30NR30E2 OR30G20D30NL30F20L30H20" 170 LINE(100,100)-(70,95),PSET 180 LINE-(70,65), PSET 190 LINE-(100,70), PSET 200 LINE (70, 95) - (40, 65), PSET, B 210 LINE (130, 100) - (160, 95), PSET 220 LINE-(160,65), PSET 230 LINE-(130,70), PSET 240 FORX=1T0600: NEXTX 250 CLS8: PRINT@224, " KA -BOOM!!!":FORX=1T0200:NEXTX 260 PCLSO: SCREEN1.1 270 FORN=1T0101 STEP5:CIRCLE(126 , 95) , N: NEXTN 280 FORN=101TO1 STEP-5:CIRCLE(12 6,95), N,O: NEXTN 290 PCLS:FORN=1T050:S=RND(255):S OUNDS, 1:LINE(126, 95) - (S, RND(195)) PSET: NEXTN 300 CLSO:PRINT@192, "AS THE DUST SETTLES," 310 PRINT@256, "THE WIZARD'S WORK IS REVEALED."

320 PRINT@320, "THE ULTIMATE POWE R DEVICE!!!":FORX=1T02000:NEXTX 330 PCLS: DRAW"BM 55, 156; R150; U10 ; BH40; BL10; L140; D10; R125; F20; L12 5;U10;R105;F10;BM 55,156;U10;R14 O; BR10; U78; D10; BL10; D68; H40; U28; D28; F40; BR10; U68; BL10; " 340 CIRCLE (55, 151), 3, 5, 2 350 CIRCLE(35,131),3,5,2 360 CIRCLE(15,111),3,5,2 370 DRAW"BM 55,78;R140;BR10;U10; H40; L150; D10; R125; F20; L125; U10; R 105; F10; BM 55, 78; U10; R150; " 380 DRAW"BM 205, 156; U40; C0; U10; C 5;R20;H19;F19;U38;R10;L10;H40;D1 8; U18; R10; F40; D90; L10; H19; F19; U4 2; L20; " 390 CIRCLE (55, 73), 3, 5, 2 400 CIRCLE (35,53),3,5,2 410 CIRCLE(15,33),3,5,2 420 SCREEN1,1:PMODE4,5:PCLSO 430 POKE65495, 0 440 PI=3.14159:Q=1 450 A=-4*PI:B=4*PI:N=360:R=20 460 IF Q>=1 THEN R=R+Q 470 X=(B-A)/N 480 F=255/(B-A) 490 FOR I=A TO B STEP X 500 X=I*F:Y=R*SIN(I+Q) 510 PSET((X+140), (80+Y), 1) 520 NEXTI 530 Q=Q+7 540 CLSO: IF Q=8 THEN PRINT@224,"

BEGIN WAVE FORM GENERATION": FORX =1T0900: NEXTX 550 SCREEN1,1 560 IF Q>56 GOTO580 570 GOT0450 580 POKE65494,0 590 CLSO: PRINT@224, "WARNING-EXCE SSIVE ENERGY LEVEL": FORX=1T0900: NEXTX 600 CLS4: PRINT@96." ALERT! ALERT!" 610 FORX=1TO5:SOUND156.3:SOUND92 .2: NEXTX 620 PRINT@128, "THERMAL RUNAWAY C ONDITIONS!" 630 PRINT@192, "DEVICE OVERLOAD!! 640 PRINT@256, "SPONTANEOUS EMISS IONS EXPECTED!" 650 PRINT@320, "DISINTEGRATION AL ERT!!!":FORX=1T02500:NEXTX 660 FORS=1T0100 670 PMODE4,1:SCREEN1,1:FORX=1TO5 O: NEXTX 680 IF S=50 THEN PCLSO: GOSUB720 690 PMODE4,5:SCREEN1,1:FORX=1TO5 O: NEXTX 700 NEXTS 710 GOTO10 720 FORN=1T091 STEP5:CIRCLE(126, 95) . N: NEXTN: RETURN 730 PCLEAR8: GOT070

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Reviving A Nearly Lost Art With Little Letter Writer

By Steve Blyn Rainbow Contributing Editor

etter writing is an often overlooked skill, not only in conjunction with computers but also in education in general. Letter writing was once the universal way of communicating with others that you could not visit. Now letter writing is becoming a lost art. The invention of the telephone and the recent rise of the use of modems has fostered a decrease in letter writing in our country.

Letter writing remains an important skill to learn. Besides, it is fun. You can't yet easily call a baseball player or a

famous author on your modem.

I always enjoy teaching units on letter writing. To make the teaching more enjoyable, I encourage the students to write practice letters to real personalities. Some ideas that we have used successfully are letters to famous people in the news, sports figures, show business personalities, authors of books that we have read and illustrators of children's books.

It may be obvious, but please try to make certain that the people that the children write to are still alive. We often have the pleasure of receiving answers to our letters. Famous personalities often respond or have a secretary write a response for them. Some illustrators have sent sketches back

to the children.

There are many fine word processors on the CoCo market today. They may all be used to help create professional looking letters. I use two different ones in my classroom to acquaint the students with different styles of word processors. This month's article presents the *Little Letter Writer*.

The Little Letter Writer's value is that it teaches the correct format of a friendly letter. Business letters are a more advanced form of letter writing and should be taught after

the friendly letter is fully mastered.

Friendly letters have a specific format to follow. The components are the Date, the Greeting or Salutation, the Body of the letter, and the Closing. Each part is taught to middle grade students and is reinforced by this program. The placement of the portions of the letter is correctly done

by the program.

The Salutation has lately become the most amusing portion to teach. Not too many years ago, it was proper to addresss most unknown recipients of letters as "Dear Sir,..." Now, of course, there are so many women working that we often use "Dear Person, ..." In the near future, perhaps computers will read our mail. It is fun for kids to speculate on what the future common salutations will be. Will it be "Dear Machine, ..." or perhaps "Dear It, ..." or perhaps "Dear RAM, ..."

The program asks if you have a printer. If you answer yes,

(Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He and his wife, Cheryl, own Computer Island.)

then Z will equal I and the letter will appear on the screen as well as on the printer. The program lines ending in the number five have information for the printer. You may omit these if you are not using a printer.

Several special factors were taken into consideration while developing this short program. On an input for the date, a comma will give an Extra Ignored message and then will ignore the year after the comma. To solve this, Line 70 will wipe out this message, and the comma and the year will automatically be inserted on Lines 130 and 135 in any case. Also, words may break up at the end of lines. This is unfortunate, but our aim was to show the parts of a friendly letter, rather than to create a word processor. The letter is also limited to about 250 characters. This should be sufficient for most early student purposes.

There is no need to indent for the body of the letter. The correct tabs and margins have been pre-set by the program. A random selection of closings is included to show the student some of the possibilities. As soon as the [ENTER] key is pressed at the end of the body, the letter will be printed in correct form on the screen and on the optional printer. After the letter is printed, you may press any key to begin

The Little Letter Writer can be used in several ways. Corrections can be made on the screen either before or after printing. Buddies may also correct each other's product. We hope your children or students use this program to write letters to real live people. The answers they receive are great

Language Arts reinforcement. Perhaps they will even drop us a line at Computer Island. We will gladly respond.

80 0178 160 02D5 END . . . 040F

The listing:

5 REM"A LITTLE LETTER WRITER BY STEVE BLYN, COMPUTER ISLAND, 1983"

10 CLS

20 L\$="LETTER WRITER"

30 FORT=1T013:PRINT@8+T, MID\$(L\$, T, 1):NEXT

40 PRINT:LINE INPUT"ARE YOU USIN G A PRINTER?";PR\$

45 IF LEFT\$(PR\$,1)="Y" THEN Z=1

50 PRINT@9, "LETTER WRITER";

60 SOUND200,1:PRINT@64, "the date ":PRINT"WHAT IS TODAY'S DATE?":I NPUTD\$

70 PRINT@160," "

CC SOFTWARE

EXTENDED BASIC not Required unless noted. Programs * require a 16K Computer and are Disk Compatible. *

* UNIVERSAL PROGRAM 1(UP-1) *

A powerful utility that allows programs to be * stacked in memory until the memory is filled. Jump * from one program to another or compose new ones * while retaining the old ones. Also included are tools for patching defective programs plus many other useful functions. Tape \$14.95, Cart. \$24.95

* DISASSEMBLER-ASSEMBLER (DISASM) *

Designed for CC Compatibility DISASM uses English Mnemonics & Decimal Locations rather than * HEX and special symbols. Write Machine Language Programs or Subroutines with the Assembler. Dis- *
Assemble the CC ROMS or any other ML Program with * the Disassembler. Tape \$19.95, Cart. \$29.95

* * TERMINAL PROGRAM (DYTERM) *
* DYTERM converts a CC into a terminal Receive and * send data between 2 computers, another terminal or a MODEM. BASIC Program with ML subroutines.

DYTERM Cassette \$14.95, Cart. \$24.95

* FINANCE PROGRAM (DYFIN) * new DYFIN quickly calculates loans, savings, annuities,*
Investments, Retirements, Interest on Loans, Payments on loans, Check book Balance, & Return on *
money invested. A 500 year Calender is included. *
Extended Basic is required. DYFIN Tape \$19.95 *

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Increase your computer's memory with the following * Memory Expansion Kits. Soldering is not required * and the modifications are reversible. Each kit is * warranted for one year.

ME-1 upgrades 4K to 16K \$19.95 ME-2 upgrades 4K to 32K \$59.95 ME-3 upgrades 16K to 32K \$39.95 ME-4 upgrades D & E CC to 64K ME-4F upgrades F series to 64K \$89.95 Note: ME-4 & ME-4F require a 1.1 ROM. WE WILL install our kits in your Computer for \$10 + ship.

\$24.95 6809E Microprocessor Chip 6821 Peripheral Interface Adapter \$6.95 6883 SAM Chip \$29.95

SAM BUFFER (new). Solderless installation mounts on SAM Chip & saves SAM if a short occurs from up-grading Memory or other modifications. \$8.95 EXTENDED BASIC ROM \$85.00

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The 96KX is a plug in cartridge that allows * use of all 64K of RAM for 64K Computers. An output * connector is included for Disk Drives, Cartridges, * other accessories. Powerful permanent software allows exchanging information in PAGE 0 & Page 1, moving blocks of data in either page or from one page to another, writing or reviewing data characters in memory, editing BASIC Programs with *
errors, changing any statement number, storing HEX *
or DECIMAL Values in Memory, and much more. The *
96KX has a ROM that occupies the upper 8K of mem- * ory allowing a CC to be a true 96K Computer with * 32K of ROM and 64K of RAM. The 96KX Software is * always available as a HELP program and can be * called with a simple keyboard command. Included *
is a hardware interrupt switch for running ML *
programs or accessing the cartridge when the *
Computer fails to function properly. Expand your * Computer now with a 96KX for only \$89.95.

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DYNAMIC ELECTRONICS INC 896 (205) 773-2758 HARTSELLE, AL 35640 eting or salutation":PRINT"TO WH OM ARE YOU WRITING A LETTER";: IN PUT W\$ 90 SOUND200,1:PRINT:PRINT"the cl osing or ending":PRINT"WHAT IS Y OUR NAME?": INPUT N\$ 100 SOUND200,1:PRINT:PRINT"the b ody or story - PRESS ENTER AND B EGIN YOUR MESSAGE";: INPUT EN\$ 110 CLS 120 INPUT B\$ 130 CLS:PRINTTAB(15)D\$;",1984 135 IF Z=1 THEN PRINT#-2, TAB(40) D\$;",1984" 140 PRINT"DEAR "; W\$; ", " 145 IF Z=1 THEN PRINT#-2, "DEAR " ; W\$; ", " 150 B\$=" "+B\$ 155 IF Z=1 THEN PRINT#-2," 160 PRINT:FORT=1 TO LEN(B\$):PRIN TMID\$(B\$,T,1);:SOUND175,1:NEXT:P RINT 165 IF Z=1THEN PRINT#-2," ":FOR T=1TO LEN(B\$):PRINT#-2,MID\$(B\$,T ,1);:NEXT T:PRINT#-2," " 170 R=RND(4) 180 IF R=1 THEN R\$="YOURS TRULY, 190 IF R=2 THEN R\$="LOVE," 200 IF R=3 THEN R\$="SINCERELY." 210 IF R=4 THEN R\$="FONDLY," 220 PRINT" ":PRINTTAB(15)R\$ 225 IF Z=1 THEN PRINT#-2." ":PRI NT#-2, TAB (40) R\$ 230 PRINTTAB(15)N\$ 235 IF Z=1 THEN PRINT#-2, TAB(40) N\$ 240 AGAIN\$=INKEY\$ 250 IF AGAIN\$="" THEN 240 ELSE C LS: GOTO50

80 SOUND200,1:PRINT@192, "the gre

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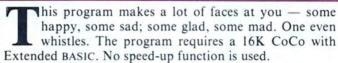
UPGRADE



FACE



To Face



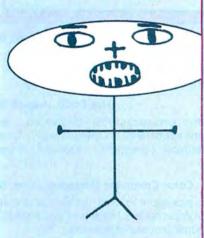
Have you ever seen those toys, or games, where you are supplied with several styles of noses, mouths, etc? Then you select those styles at random and place them on a featureless face to produce your own creation? (For instance, "Picture Your Face" in the October 1983 Rainbow.) It also selects different shaped heads at random. The selection of eyes, mouths, noses and eyebrows gives 2,200 faces. Couple those with several different heads and we get not 5,000, not 10,000, but 15,400 combinations. Couple this with the colors and we get 61,600 combinations. Each face is on the screen for about five seconds. With no repeats, it would take about 80 hours for each of the combinations to appear on the screen.

To get the show on the road, type, or load the program into the computer. Type RUN and press [ENTER]. Watch the screen for a while. See if you can spot the same face

You may want to try some of your own features. To do this, observe the program. Take eyes, for example. The RND statement in Line 180 selects a number from 1 to 8. Let's see what happens when the computer selects 5. We tell the computer what to do if E is equal to 5. In Line 230 the computer is sent to Line 1080. Starting at Line 1080, two eliptical circles are drawn. The .45 represents a height width ratio which is wider than high. Kind of a vertical elipse. After the two eliptical circles are drawn, the computer is returned to the line following the one that sent it there; Line 240. Each feature is selected in a similar manner. Give it a try. You may create some interesting faces.

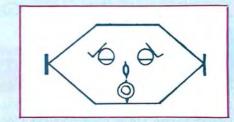
By John W. Kozubal



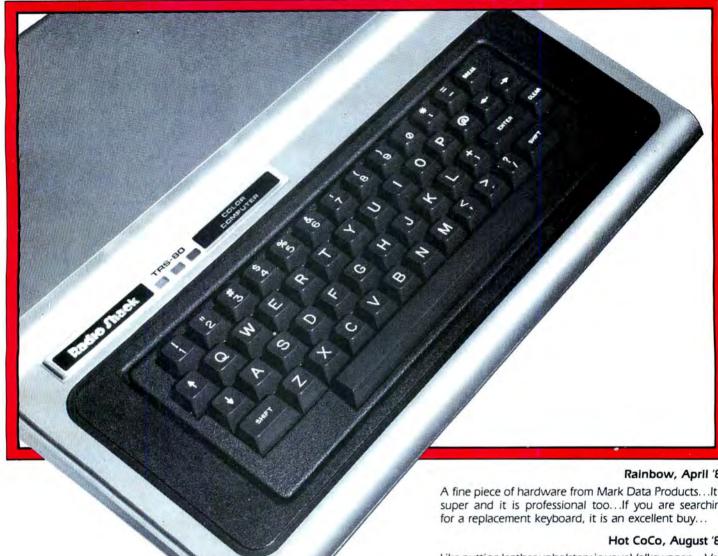


To Face

(John W. Kozubal, a disabled southern Californian, is a former president of a TV sales and service company and former electro hydraulic engineer for General Electric.)



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Color Computer Magazine, June '8

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- Works with 16K, 32K or 64K computers.
- Available on disc or cassette.

51 CHARACTER BY 24 LINE DISPLAY

Super Screen is a powerful, machine language program that significantly upgrades the performance and usefulness of 16K or greater, Extended and Disc Basic Color Computers. The standard Color Computer display screen is totally inadequate for serious, personal or business applications o Super Screen replaces it with a brand new, 51 character wide by 24 line screen including full upper and lower case characters. Instead of a onfusing checkerboard appearance, you now have true lower case letters along with a screen that is capable of displaying 1224 characters. The lifference is startling! Your computer takes on new dimensions and can easily handle lines of text that were simply too long and complex to display on the old screen.

COMBINE TEXT WITH HI-RES GRAPHICS

ou can now write truly professional looking programs that combine text with hi-res graphics. Super Screen allows you to create graphics displays with the Basic LINE, DRAW and CIRCLE statements and then notate the graphics with descriptive text. You can even use PRINT @ if you wish for treater programming convenience. Super Screen's versatility will amaze you.

PRINT @ IS FULLY IMPLEMENTED

he PRINT @ statement is a valuable asset to the programmer when formatting text on the screen. The standard Color Computer will report an error you specify a location higher than 511 but Super Screen allows locations all the way to 1223! You get a big screen and a powerful formatting tool as well. Of course, Super Screen also supports the CLS command allowing you to clear the big screen using standard Basic syntax.

ON ERROR GOTO

'hat's right! Super Screen gives you a full implementation of ON ERROR GOTO including the ERR and ERL functions. Now you can trap errors and ake corrective action to prevent crashed programs and lost data using the same standard syntax as other computers. The ON ERROR GOTO apability overcomes a serious deficiency of Color Computer Basic and greatly improves your capability to handle sophisticated tasks. All well written, 'user friendly' programs use error trapping techniques and yours can too! Now that's power!

AUTO KEY REPEAT

To more frustration as you edit a long line in your Basic program; just hold the space bar down and automatically step to the desired position in the ne. Need a line of asterisks? Hold the key down and auto repeat will give them to you. Those of you who spend many hours at your keyboard will ppreciate this outstanding addition to Super Screen's long list of impressive capabilities.

CONTROL CODES FOR ADDITIONAL FUNCTIONS

Super Screen recognizes several special control code characters that allow selection of block or underline, solid or blinking cursor and other unctions. You can 'Home up' the cursor or you may erase from the cursor to the end of a line or to the end of the screen just like many other omputers. These special codes give you an extra dimension of versatility and convenience that put Super Screen in a class by itself.

AND MORE GOOD NEWS...

Super Screen comes with complete, well detailed instructions and is available on cassette or disc. It adjusts automatically to any 16K or greater, extended or Disc Basic Color Computer or TDP-100 and uses only 2K of memory in addition to the screen memory reserved during power up. Suaranteed to be the most frequently used program in your software library...once you use it, you won't be without it! Super Screen's low price will eally please you; only \$29.95 on cassette or \$32.95 on disc!



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180....018F 590....0492 840....072B 1220...09C4 1540...0C5B END...0E82

The listing:

10 CLS4

30 ' BY JOHN W. KOZUBAL 10353 COMPTON BLVD. BELLFLOWER, CA 90706

40 ' 50 '

60 ' FOR USE ON 16K OR GREATER

70 ' MUST HAVE EXTEVDED BASIC

80 ' NO SPEED-UP FUNCTION USED

90 PRINT @ 236, "FACES";

100 PLAY "T25503CGCG05CG"

110 A=A+1: IF A=20 THEN 120 ELSE

100

120 PCLS: P=RND (4)

130 S=RND(2)-1

140 PMODE P. 1

150 SCREEN 1,S

160 PCLS

170 FOR X=1 TO 30:NEXT:PLAY"05T2

HEAD

55CGCGCG

180 E=RND(8)

190 IF E=1 GOSUB 860

200 IF E=2 GOSUB 970

210 IF E=3 GDSUB 1000

220 IF E=4 GOSUB 1030

230 IF E=5 GOSUB 1080

240 IF E=6 GDSUB 1050

250 IF E=7 GOSUB 910

260 IF E=8 GOSUB 1110

270 H=RND(7) *

280 IF H=1 GOSUB 610

290 IF H=2 GOSUB 670

300 IF H=3 GOSUB 740

310 IF H=4 GOSUB 720

320 IF H=5 GOSUB 770

330 IF H=6 GOSUB 790

340 IF H=7 GOSUB 830

350 M=RND(11) " MOUTH

360 IF M=1 GOSUB 1440

370 IF M=2 GOSUB 1470

380 IF M=3 GOSUB 1490

390 IF M=4 GOSUB 1510

400 IF M=5 GOSUB 1560

410 IF M=6 GOSUB 1580

420 IF M=7 GOSUB 1680

430 IF M=8 GOSUB 1700 440 IF M=9 GOSUB 1730

450 IF M=10 GOSUB 1750

460 IF M=11 GOSUB 1780

470 N=RND(5) NOSE

480 IF N=1 GDSUB 1320

490 IF N=2 GOSUB 1350 500 IF N=3 GOSUB 1370 510 IF N=4 GOSUB 1390 520 IF N=5 GOSUB 1410 530 B=RND(5)' 540 IF B=1 GOSUB 1170 550 IF B=2 GOSUB 1200 560 IF B=3 GOSUB 1230 570 IF B=4 GOSUB 1260 580 IF B=5 GOSUB 1290 590 FOR X=1 TO 2000:NEXT X:GOTO 120 600 *********HEAD****** 610 CIRCLE(128,96),80 'CIRCLE 620 DRAW "BM49,86;L5D15R5" 630 DRAW "BM207,86; R5D15L5" 640 DRAW "BM168,165;F10" 650 DRAW "BM88, 165; G10" **660 RETURN** 670 CIRCLE(128,96),44.44,,1.8 ' VERTICAL ELIPSE 680 DRAW "BM128,175;R30U5D5E5G5R 5L5F5H5L30D15U15L30U5D5H5F5L5R5G 690 RETURN 700 DRAW"BM128, 96; BL75E50R30F50 710 RETURN 720 DRAW"BM128,96;BL75E50R50F50G

L*BERTO

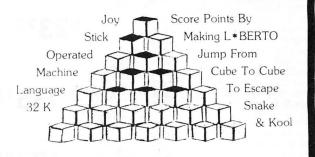
730 RETURN

50L50H50U10D20U10F50R50E50U10D20

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\$1.50 POSTAGE & HANDLING Illinois Residents Include 6% Sales Tax 740 CIRCLE(128,96),100,,.5 ' 990 RETURN HORIZ ELIPSE 1000 DRAW "BM100, 96; H4F8H4E4G8" 750 DRAW "BM128.160; U15D15R30U2R 1010 CIRCLE(100,96),6 2D4L2U2L60U2L2D4R2U2R30D7D15F6H6 1020 RETURN G6E6" 1030 CIRCLE(100,96),5,..2 760 RETURN 1040 RETURN 770 DRAW"BM125, 96; BL50U84R100D16 1050 CIRCLE(156,96),8,,1.5 8L100U84" 1060 CIRCLE(100,96),8,,1.5 780 RETURN 1070 RETURN 790 CIRCLE(128,96),200,..3 1080 CIRCLE(100,96),8,,.45 800 3 HOR ELIPSE, WIDE 1090 CIRCLE(156,96),8,,.45 810 RETURN 1100 RETURN 820 " VERT ELIPSE, HIGH 1110 CIRCLE(100,96),8 830 CIRCLE(128,96),40,,3.5 1120 CIRCLE(156,96),8 840 RETURN 1130 DRAW"BM100, 96; BD2; L3R7" 850 *******EYES******** 1140 DRAW"BM156,96; BD2; L3R7" 860 CIRCLE(100.96).3 1150 RETURN 870 CIRCLE(156,96),3 1160 *******BROW******** 880 CIRCLE(156,96),8,,.3 1170 DRAW "BM100,86;L3G1E1R3F3" 890 CIRCLE(100,96),8,,.3 1180 DRAW "BM156,86; L3G3E3R3F1" 900 RETURN 1190 RETURN 910 CIRCLE(100,96),10 1200 DRAW "BM100,86;L5R8F10" 920 CIRCLE(156,96),10 1210 DRAW "BM156,86;R5L8G10" 930 DRAW"BM100,96;BR8;R38;U2;L38 1220 RETURN D2" 1230 DRAW "BM100,86;R10L20U1R20U 940 CIRCLE(100,96),1 1L20U1R20" 950 CIRCLE(156,96),1 1240 DRAW "BM156,86;L10R20U1L20U 960 RETURN 1R20U1L20" 970 CIRCLE(100,96),3 1250 RETURN 980 CIRCLE(156,96),3 1260 DRAW "BM100,82;G13H2" 1270 DRAW "BM156,82;F13E2" 1280 RETURN 1290 CIRCLE(100,96),15,,2,.6,.91 1300 CIRCLE(156, 109), 13,,2,.6,.9 1 Saguaro Software 1310 RETURN 1320 *********NOSE******** 7331 E. Beverly Dr. 1330 DRAW "BM128, 96; D10L3R6" Tucson, AZ 85710 1340 RETURN VISA (602) 885-6508 1350 DRAW "BM128, 100; G10E10F10" 1360 RETURN Business/Utilities 1370 CIRCLE(128,106),4,,2 FILMASTR Prickly-Pear Mailing List (Disk) New Ver. PP 37.75 ä 1380 RETURN Real Estate Investment 18 75 PFA \equiv **\$23**75 1390 CIRCLE(128, 106),2 Statistical Analysis PFA 26.75 Statgraf Sugar 20.75 1400 RETURN Stress Evaluator PFA 18.75 1410 CIRCLE(128, 106), 15...2 Tims Mail 15.75 Sugar SUPER DISK UTILITY Tims Database Sugar 20.75 1420 RETURN Bond Yield PFA 17.75 1430 *******MOUTH******** Co-Co Receivables (New) Saguaro 29.95 \$**35**75 Eight-Bit Bartender (Office Parties!) 1440 DRAW "BM110,130;R46" P.P. 14.75 1450 DRAW "BM122,130; D6L3U6R2D6L Colorkit 26.75 PP Disk Manager 18.75 PP 2U6R1D6" Disk Master (Disk) New Ver. P.P. 18.75 PAPE Disk Zapper!!! 1460 RETURN PP 26.75 Omni Clone (Lowest Price!) PP 29.75 1470 CIRCLE(128,136),30,,.25,.5 Super Disk Utility (Disk) PFA 35.75 **OMNICLONE** Auto Run 1480 RETURN 15.75 Sugar Semigraf 15.75 Sugar 1490 CIRCLE(128,136),20,,1.2,.5 DON'T BE FOOLED! We sell Move-It! Saguaro 15.95 Automatic Tape To Disk only genuine Radio Shack 1500 RETURN Disk available - add \$3.00/program. Amdek disk-add \$6.00/program. Add \$1.00 per item shipping (\$4.00 maximum). Az. residents add 7% tax. disk controllers and Amdek 1510 CIRCLE(128,136),9 cables. 1520 CIRCLE(128,136),7 1530 SOUND 200,2:SOUND 190,2:SOU We carry Prickly-Pear, Petrocci Freelance Associates, and Sugar Software. Authors...check with us about royalties. ND 200.3

1540 PLAY "T100; CDEFG; 03; AB04; CD EFGAB05; CDEFG": SOUND 250, 2: FOR Y =1 TO 800: NEXT Y 1550 RETURN 1560 CIRCLE(128, 136), 30,,.1,.5 1570 RETURN 1580 CIRCLE(128, 132), 30,,.5 1590 'HOR ELIPSE - FULL 1600 DRAW "BM128, 126; BR20U4L1D4B L5U6L1D6BL6U7L1D7BL7U8L1D8BL6U7L

L5U6L1D6BL6U7L1D7BL7U8L1D8BL6U7L 1D7BL6U5L1D5BL6U3L1D3" 1610 DRAW "BM128,138;BR20D4L1U4B

L6D6L5U6BL7D8L1U8BL5D7L1U7BL6D7L 1U7BL7D5L1U5BL4D3L1U3"

1620 SOUND 1,1

1630 PLAY"T255; 05CDEFG"

1640 B=B+1

1650 IF B=14 THEN 1670

1660 GOTO 1620

1670 RETURN

1680 CIRCLE(128,115),30,,.8,.1,.

4

1690 RETURN

1700 CIRCLE(128,115),30,,.8,.95,

- 4

1710 ' OFF CENTER SMILE

1720 RETURN

1730 DRAW "BM128,135;H20E2G4E2F3 0E2G4"

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		(Shipping Included)	
Name		Tax (NC Res. add	
Address		- 4%)	
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1740 RETURN 1750 CIRCLE(128,115),30, ,.7,0,.5 1760 ON CENTER SMILE 1770 RETURN 1780 CIRCLE(128,115),30,,.7,.1,.55 1790 RETURN

Hint . . .

Upside-Down Loading

If you've been having problems with I/O Errors when loading programs from cassette, try reloading with the cassette recorder placed upside down. It may not be technically refined, and it may not work, but when faced with the dreaded I/O it's worth a try. Besides, Rick Bullon, who suggested this method, says it works for him 90 percent of the time.



-A Most Moving Message

_By Oleg Boyarsky

ow many times have you seen your program lose its "touch" just when someone had to simply read the Linstructions? Well, now you can think about the reaction on your friend's face when he sees all your messages "run" across the screen. That's right, the following program, even though it's very small, will move any message any place across the CoCo screen. While running it, you simply have to enter where the message is to appear (letter by letter), and where the message is to disappear (letter by letter). In case you have forgotten, all "PRINT @" locations are in the back of your CoCo manual. Think of the possibilities of moving your messages across the screen at an enormous speed. Best of all, this program fits any size Color Computer, and it can be easily adapted to your own programs. This program is made to be used by itself, but if you want to adapt this "message mover" to your programs, simply delete Lines 10-30, and upon entering the subroutine have S equal your finish PRINT @ position, P equal your start PRINT @ position and A\$ equal your message. Also, change Line 70 to read: 70 IF B\$=""THEN RETURN ELSE40. If the message moves too fast for you, then enter the following lines into the program which will make the messages move faster or slower depending upon the ASCII number for that letter. (The ASCII numbers can be found at the end of the CoCo manual.) Okay, the lines are:

52 C\$=INKEY\$:IF C\$ <> "" THEN C=ASC(C\$)*5

54 FOR DE = 1 TO C: NEXT DE

Also, if you want the program to start over after each message is written, then change Line 70 to read: 70 IF B\$="" THEN5 ELSE40.

Now, here is the line by line explanation of the original program.

Line 5 Clears the screen and plenty of string space for the program's use.

Lines 10-20 Enter the start and stop information and check it at the same time to make sure that the values are

(Oleg Boyarsky is currently a junior in high school. His main hobbies include electronics and computer programming. He and his brother have built a tremendous library of hardware and software for the Color Computer.)

within the boundaries of the screen, and that the start is not less than finish.

Line 30 Enters the message and puts it into the A\$. This line also clears the screen.

Line 40 The main use of this line is to create the initial effect when the message appears on the screen letter by letter. Simply, this line states: If B\$ is the same as A\$ (original message "holder") then don't do anything; if not, then take one letter or character from A\$ and put it in a corresponding place in B\$.

Line 50 This line does just the opposite. It creates the disappearing effect. It simply states that: Reduce the printing position (P) by one only if it is not equal to the stop position (remember, it's the one you entered in the beginning). If it is equal, then take the first character of the B\$ (computer's message holder) and erase it.

Line 60 This line prints the B\$ and a space after it to create the disappearing effect.

Line 70 This line checks to see if everything is finished; if not, then go back to Line 40.

As you can see, the program is easy to change in order to fit into your own programs. Or, don't touch it at all, and simply use it as is. Anyway, the decision is yours, play around with it, I am sure that it will provide you hours of entertainment.

The listing:

5 CLS: CLEAR1000 10 INPUT"PLEASE INPUT THE FINISH POS. "; S: IF S<0 OR S>511 THEN 10 20 INPUT"PLEASE ENTER THE START POS"; P: IF P<0 OR P>510 OR P<S TH EN 20 30 PRINT: LINE INPUT"PLEASE ENTER THE MESSAGE "; A\$: CLS: IF A\$=""THEN 30 40 IF D<>LEN(A\$) THEN D=D+1:B\$=B \$+MID\$ (A\$, D, 1) 50 IF P=S THEN B\$=RIGHT\$(B\$, LEN(B\$)-1)ELSE P=P-1 60 PRINT@P, B\$" "; 70 IF B\$=""THEN END ELSE40

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OS9 Converter

The program you need with OS9 is here.

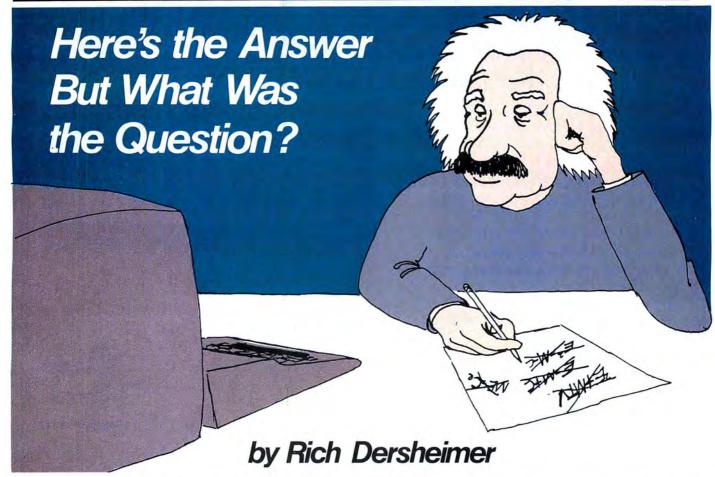
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T've noticed that lately there has been a lot of educational software for sale, and it seems that there are lot of programs for teaching kids the basics of math. It also seems that most of these math programs ask the student to give the answer to an equation or math problem. So, I thought it would be neat to write a program that gives the answer and asks for the equation.

This turned out to be a tougher problem than I expected. I tried using the BASIC VAL statement, but it won't accept the operators (+-*/) as part of the variable. For a while I thought about digging into the ROM to find out how the CoCo interprets equations, but I don't know enough about assembly language for that. Then I remembered a letter to the editor that appeared in the June 1981 issue of the Rainbow. A Mr. Poster of New Jersey had come up with a method for changing program lines while the program was running. If I could start with some kind of dummy equation, and then change it to match the player's input, I could let BASIC figure the equation.

Since Coco doesn't compile the program, instead interpreting each line as it comes to it, this technique works just fine.

The Program

Lines 30—70: This disables the break and [SHIFT][@] keys

(Rich Dersheimer is the graphics director at KVII-TV in Amarillo, Texas. He taught several classes for children this summer, using 10 TRS-80 CoCos at the Don Harrington Discovery Center in Amarillo.)

while the program is waiting for the equation input. (This routine was written by Charles Roslund and appeared in *Color Computer News*, Issue No. 6, February 1982)

Line 80: Reseeds the random number generator.

Line 110: Holds the equations.

Line 120: Rounds off the answer to three places.

Lines 140—170: Set up the game screen.

Lines 180—210: Use the BASIC beginning of program pointer and *PEEKS* to find line 110.

Lines 260—380: Build the computer's equation. At various levels of play the equation will include addition, subtraction, multiplication and division.

Lines 410—540: More screen set up. Outputs the numbers and symbols used to form the equation.

Lines 550—680: Get the input from the player. Checks for help wanted, quit the game, start the equation over, and check the equation.

Line 690: Checks to see if all symbols have been used.

Lines 690—750: Build the player's equation.

Line 760: Incorrect routine. A tone is sounded and the computer's equation is shown.

Lines 770—790: Correct equation. A tune is played and the computer's equation is shown. If the player gets three correct in a row, the level of difficulty is raised.

Lines 800—870: Run out of time routine. A tone is sounded.

Lines 840—870: Display of computer's equation.

Lines 900—920: Raise the difficulty one level.

Lines 970—1160: Subroutine to solve the equation. The equation is *POKED* into Line 110, using ASCII values for numbers, and BASIC tokens for the operators. Then Line 110



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Lines 1170—1340: Displays the title page.

Lines 1350—1510: Instructions. If no response is given on any instruction page, the program returns to the title page. That way if you go off and leave the program running, it doesn't just sit there.

Lines 1530—1600: Pick level. This returns to the title page if no response is given.

Lines 1620—1990: Data for title page. Hex codes for the graphic blocks that make up the title.

Line 2000: A reverse reference that *PCLEARS* one page of graphics.

The program should be simple and easy to operate. If it should happen to bomb out, check to see that Line 110 is still as follows:

110 A=*********

Mathgame will run on a 16 or 32K system, with or without disk. I have included several features in the program that I feel are useful in an educational program for young people.

The [BREAK] key and the [SHIFT] [@] keys are both disabled. When looking at the instructions or picking a starting level, if the program is left unattended, it will cycle back through the title page, which will hopefully draw attention of anyone nearby. When a correct equation is entered, the player is rewarded with a simple tune. If the equations get harder, another tune is heard. When an incorrect equation is entered, a short tone is heard. This makes it more interesting to win than lose. The timer is displayed on the screen and by a short bleep, which adds lots of pressure to think quick.

Before letting a young person run this program, try it yourself, but start at an easy level. Unless you're a math genius, the harder levels are just too frustrating!

The Listing:

10 CLS0 20 GOTO 2000 30 IF PEEK(&H3EB9)<> &H32 THEN C LEAR 700, &H3EBO: FOR I=&H82B9 TO &H831E:POKE I-&H4400,PEEK(I):NEX T ELSE CLEAR 700:GOTO 70 40 FOR I=0 TO 2:POKE &H3EBD+I,18 :NEXT: I=&H3F1E 50 POKE I, & H26: POKE I+1, 3: POKE I +2, &H7E: POKE I+3, &H83: POKE I+4, & H22: POKE I+5, &H7E 60 POKE I+6, &HA4: POKE I+7, &H4C 70 POKE &H19B, &H3E 80 R=RND(-TIMER) 90 DIM EA(14) 100 GOTO 1170 110 A=********* 120 A=INT(A*1000+.5)/1000 130 GOTO 1120 140 CLS3:FOR X=33 TO 449 STEP 32 :PRINT@X,STRING\$(30," ");:NEXT X :PRINT@66, "THE NUMBER IS"; 150 PRINT@418, STRING\$ (26, 191);

160 PRINT@290, STRING\$ (26, 191);

```
170 FOR X=322 TO 386 STEP 32:PRI
NT@X, CHR$(191);:PRINT@X+25, CHR$(
191);:NEXT X
180 ST=PEEK (25) *256+PEEK (26)
190 IF PEEK(ST)=173 THEN 220
200 ST=ST+1
210 GOTO 190
220 FOR X=1 TO 14
230 EA(X)=0
240 NEXT X
250 E$=""
260 FOR X=1 TO N
270 R=RND(9):E$=E$+MID$(STR$(R),
2,1)
280 EA(R)=EA(R)+1
290 IF X=N THEN 330
300 IF EA(12)=0 AND (L5=4 OR L5=
6) AND RND(3)=1 THEN E$=E$+"*":E
A(12)=EA(12)+1:GOTO 330
310 IF EA(13)=0 AND (L5=5 OR L5=
6) AND RND(3)=1 THEN E$=E$+"/":E
A(13)=EA(13)+1:GOTO 330
320 IF RND(2)=1 THEN E$=E$+"+":E
A(10)=EA(10)+1 ELSE E$=E$+"-":EA
(11) = EA(11) + 1
330 NEXT X
340 IF EA(10)=0 OR EA(11)=0 THEN
350 IF L5=4 AND EA(12)=0 THEN 22
360 IF L5=5 AND EA(13)=0 THEN 22
370 IF L5=6 AND (EA(12)=0 OR EA(
13)=0) THEN 220
380 CE$=E$:A$=E$:L=LEN(E$)
390 GOSUB 970
400 E=A: A$=""
                           " 5
410 PRINT@80."
420 PRINT@80,E;
430 FOR X=27 TO 4 STEP -1
440 SET(58, X, 5): SET(59, X, 5)
450 NEXT X
460 T=4
470 TIMER=0
480 A$="":PRINT@200,STRING$(LEN(
E$),".");"
                 ";:P=200
490 PRINT@323, "";:FOR X=1 TO 9:I
F EA(X)=0 THEN NEXT X ELSE FOR Y
=1 TO EA(X):PRINT X;:NEXT Y:NEXT
 X
500 PRINT@355, "";: IF EA(10)=0 TH
EN 510 ELSE FOR X=1 TO EA(10):PR
INT" + "; :NEXT X
510 IF EA(11)=0 THEN 520 ELSE FO
R X=1 TO EA(11):PRINT" - ";:NEXT
520 IF EA(12)=0 THEN 530 ELSE FO
R X=1 TO EA(12):PRINT" * ";:NEXT
530 IF EA(13)=0 THEN 540 ELSE FO
```

99

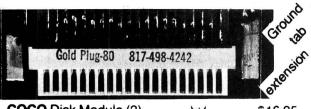
R X=1 TO EA(13):PRINT" / ";:NEXT X 540 PRINT@390, "USE THESE SYMBOLS " 5 550 I = INKEY = 560 IF TIMER>N*25 THEN RESET(58, T):RESET(59,T):TIMER=0:T=T+1:SOU ND 200,1 570 IF T=28 THEN 800 580 IF I\$="" THEN 550 590 IF I = "Q" THEN CLS: END 600 IF I\$="H" THEN 1380 610 IF I\$=CHR\$(13) THEN 690 620 IF I\$=CHR\$(12) THEN 480 630 IF I\$=" " THEN 550 640 FOR W=1348 TO 1369 STEP 3: IF PEEK(W) = ASC(I\$) + 64 THEN POKE W, 96:PRINT@P, I\$;:P=P+1:GOTO 550 650 NEXT W 660 FOR W=1380 TO 1398 STEP 3:IF PEEK(W) = ASC(I\$) + 64 THEN POKE W. 96:PRINT@P, I\$;:P=P+1:GOTO 550 670 NEXT W 680 GOTO 550 690 FOR X=200 TO 200+LEN(E\$)-1:I F PEEK(1024+X)=110 THEN PRINT@45 1, "YOU MUST USE ALL SYMBOLS";:SO UND 1,20:PRINT@451," ";:GOTO 480

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```
700 A$=A$+CHR$(PEEK(1024+X)-64)
710 NEXT X
720 L=LEN(A$)
730 GOSUB 970
740 S=A
750 PRINT@P," =";S;
760 IF E<>S THEN NW=0:PRINT@164.
"INCORRECT EQUATION!";:SOUND 1,1
5:GOTO 810
770 NW=NW+1:IF NW=3 THEN N=N+1:N
W=0:WF=1
780 IF N>8 THEN N=8
790 PRINT@164, "YOU GOT IT RIGHT!
";:PLAY"T202L4ABG01L4G02L2D":GOT
0 810
800 PRINT@164, "YOU RAN OUT OF TI
ME!";:SOUND 1,15
810 FOR X=323 TO 387 STEP 32
820 PRINT@X,STRING$(24," ");
830 NEXT X
840 PRINT@324, "COMPUTER'S EQUATI
ON IS";
850 PRINT@362,CE$;
860 FOR X=1 TO 2500:NEXT X
870 PRINT@164,"
880 FORX=323 TO 387 STEP 32:PRIN
T@X,STRING$(24," ");:NEXT X
890 IF WF=0 OR N=8 THEN 960
900 PRINT@324, "LET'S MAKE THE GA
ME";
910 PRINT@356, "A LITTLE HARDER,
OK?";
920 PLAY"T401L8FFFL1DP2L8EEEL1C#
P1"
930 PRINT@324,"
      11 5
940 PRINT@356,"
   " =
950 WF=0
960 GOTO 180
970 FOR X=1 TO L
980 A=ASC(MID$(A$,X,1))
990 IF A<58 AND A>47 THEN POKE S
T.A
1000 IF A=43 THEN POKE ST, 171
1010 IF A=45 THEN POKE ST.172
1020 IF A=42 THEN POKE ST,173
1030 IF A=47 THEN POKE ST. 174
1040 ST=ST+1
1050 NEXT X
1060 IF L=15 THEN 1110
1070 FOR X=1 TO 15-L
1080 POKE ST, 32
1090 ST=ST+1
1100 NEXT X
1110 GOTO 110
1120 ST=ST-15
1130 FOR X=0 TO 14
```

1140 POKE ST+X,173



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1150 NEXT X 1160 RETURN 1170 FOR X=1 TO 19:READ D\$ 1180 FOR Y=1 TO 19 STEP 2 1190 A=VAL("&H"+MID\$(D\$,Y,2)) 1200 A1\$=A1\$+CHR\$(A-16) 1210 NEXT Y, X 1220 FOR X=1 TO 19: READ D\$ 1230 FOR Y=1 TO 19 STEP 2 1240 A=VAL("&H"+MID\$(D\$,Y,2)) 1250 B1\$=B1\$+CHR\$(A-16) 1260 NEXT Y.X 1270 CLS7 1280 PLAY"03T2L8CDEFGDEFECP4" 1290 PRINT@33, A1\$;:PLAY"T255CDEF GABBBT4P4P4":PRINT@257,B1\$;:PLAY "T255CDEFGABBBT4P4P4":L=486 1300 R\$=" BY RICH DERSHEIMER " 1310 FOR X=1 TO LEN(R\$):N=ASC(MI D\$(R\$.X.1)) 1320 IF N>64 AND N<91 THEN N=N-6 1330 POKE 1509+X, N: PLAY"T25501CC C" 1340 NEXT X 1350 FOR X=1 TO 2000: NEXT X:CLS: PRINT: PRINT" DO YOU WANT INSTRUC TIONS?":PRINT:PRINT" PRESS Y O R N":TIMER=0

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1360 Q\$=INKEY\$: IF TIMER>1200 THE N 1270 1370 IF Q\$="" THEN 1360 ELSE IF Q\$="N" THEN 1530 ELSE IF Q\$<>"Y" **THEN 1360** 1380 CLS:PRINT:PRINTTAB(12); "M A T H":PRINTTAB(12);"G A M E":PRI NT:PRINT" IN 'MATHGAME' THE C OMPUTER WILL PICK A NUMBER, AN D IT IS YOUR JOB TO BUILD AN E QUATION TO MATCH THAT NUMBER." 1390 PRINT: PRINT" IF THE COMPUT PICKED 4 AS IT'S NUMBER, T HEN 1+1+2 WOULD BE A LEGAL EQU ATION. ": PRINT@452, "(PRESS 'C' TO CONTINUE) ": TIMER=0 1400 Q\$=INKEY\$: IF TIMER>2400 THE N 1270 1410 IF Q\$<>"C" THEN 1400 1420 CLS:PRINT:PRINT" BUT YOU W ON'T BE ABLE TO USE JUST ANY NUMBERS OR SYMBOLS. THE COMPUT WILL PICK WHICH NUMBERS AN D SYMBOLS YOU WILL BE ABLE O USE. EACH NUMBER AND OPERAT OR (+ - * /) THAT YOU MAY SE WILL BE INSIDE A" 1430 PRINT" RED BOX. EACH ONE CA N BE USED ONLY ONCE. TO USE A NUMBER OR SYMBOL, PRESS IT'S K EY ON THE KEYBOARD, AND IT WIL L GO FROM THE RED BOX TO THE E QUATION." 1440 PRINT@452,"(PRESS 'C' TO CO NTINUE) ": TIMER=0 1450 Q\$=INKEY\$: IF TIMER>2400 THE N 1270 1460 IF Q\$<>"C" THEN 1450 1470 CLS:PRINT:PRINT" IF YOU WAN T TO START OVER ON THE EQUATI ON, PRESS THE clear KEY. IF YO U ARE DONE WITH THE EQUATION, PRESS THE enter KEY TO SEE IF YOU GOT IT CORRECT. YOU WILL B E PLAYING MATHGAME AGAINST TH E CLOCK, AND WITH" 1480 PRINT" PROBLEMS THAT GET HARDER AS THE GAME GOES ON. YOU MAY PRESS THE 'H' KEY FO

N 1270 1510 IF Q\$<>"C" THEN 1500 1520 NW=0 1530 CLS:PRINT:PRINT" PICK YOUR STARTING LEVEL":PRINT:PRINT" ADDITION/SUBTRACTION":PRINT" 1)

1490 PRINT@452, "(PRESS 'C' TO CO

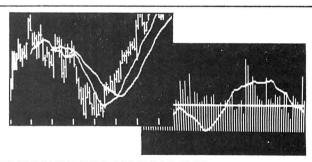
1500 Q\$=INKEY\$: IF TIMER>2400 THE

THE 'Q' KEY TO QUIT.

EASY":PRINT" 2) MEDIUM":PRINT" 3) GETTING HARDER":PRINT 1540 PRINT" MULTIPLICATION/DI VISION":PRINT" 4) NOT SO BAD":PR INT" 5) THESE ARE TOUGH": PRINT" 6) FORGET IT!" 1550 PRINT@452," (PRESS 1-6 FOR L EVEL) ": TIMER=0 1560 Q\$=INKEY\$: IF TIMER>2900 THE N 1270 1570 IF Q\$="" THEN 1560 1580 IF Q\$<"1" OR Q\$>"6" THEN 15 1590 N=VAL (Q\$):L5=N 1600 IF N<4 THEN N=N*2+1 ELSE IF N<6 THEN N=4 ELSE N=5 1610 CLS3:GOTO 140 1630 DATA AFAFF5FFFFFACACACAF 1640 DATA ACACESFEAFFSFFFFAFFS 1650 DATA FFFFAFAFF5FF 1660 DATA FFAFF1F3AFF5FFFFFFF 1680 DATA AFF5FFFAFF1AFAFF1AF 1690 DATA F5FFAFF1F7FFF3AFF5FF 1700 DATA FFFFFFAFF5 1710 DATA FFFFAFF5FFFAFF5F3F3 1720 DATA F7AFF5FFAFACACACACAF

1740 DATA AFACACACAFF5FFFAFF5 1750 DATA FFFFFFAFF5FFFF 1760 DATA FFAFF5FFFFFFFFFFFFFF 1770 DATA FFFFAFF5FFFFFFFF 1780 DATA ACF5FFFFFACF5FACF5 1790 DATA FFFFFFACF5FFFFFFAC 1800 DATA F5FFFFFACF5 1810 DATA AFACACACACACF5FFFFF 1830 DATA FFAFF5FFAFACACACACF5 1840 DATA FFFFAFF5FFFFFFFFF 1850 DATA FFAFF1F3AFF5FFFAFAF 1860 DATA F5FFAFAFF5FFFF 1870 DATA FFFFFFFFFFFFFFF 1880 DATA FFFFAFF1F7FFF3AFF5FF 1890 DATA AFF1AFAFF1AFF5FFAFAC 1900 DATA ACACF5FFFFFFFFFFAC 1910 DATA ACAFF5FFAFACACACACAF 1920 DATA F5FFAFF5F3F3F7AFF5FF 1930 DATA AFF5FFFFFFFFFFF55 1940 DATA FFFFFAFF5FFFF 1950 DATA FFAFF5FFAFF5FFFFAF 1960 DATA F5FFAFF5FFFFFFFFF 1970 DATA ACACACACACACF5FFACF5 1980 DATA FFFFFACF5FFACF5FFF 1990 DATA FFACF5FFACACACACACF5 2000 PMODEO: PCLEAR1: GOTO 30

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Approaches the excitement and challenges of any Video Arcade. The

hazards of CU*BER are many. Help CU*BER change the colors on the pyramid while avoiding many of the dangers always present. Vipers, the Nurd, the Dork, bonus points all add up to another exciting release from Tom Mix Software.





DEVIL ASSAULT 16K Machine Language \$27.95 TAPE \$30.95 DISK

Devil Assault is a multi-level multi-screen game in which bird-like creatures, robots and the devil himself assault your home base which you must



Arcade Action, Method of play you are the Grabber. The object is to grab the 8 treasures and store them in the center boxes. You start with 3 Grabbers and get extra ones at 20,000 points. Watch out for the googlies! Super high resolution graphics.

32K Machine Language

\$27.95 TAPE \$30.95 DISK

BUZZARD BAIT By RUGBY CIRCLE 32K Machine Language

\$27.95 Tape \$30.95 Disk

We've done it again! You thought the King was great? wait 'till you see this!!

Outstanding high resolution graphics, tremendous sound make this "Joust" type game a must for your software collection. As you fly from cloud to cloud you will enjoy sky high excitement dealing with the challenges presented to you by this newest release by Tom Mix Software.



AIR TRAFFIC CONTROLLER

32K Ext. Basic \$28.95 TAPE \$31.95 DISK

Air Traffic Controller is a computer model of an air traffic control situation in which Remotely Piloted Vehicles (RPV's) are operated by the controller in landing on and taking off from designated runways.

JOURNEY TO MT. DOOM

32K Mach. Lang. \$27.95 DISK ONLY

The Necromancer is about to wage war on

earth. He needs his lost gold ring to acquire the power to do so. You must find the ring, take it to Mt. Doom and destroy it in the flames from which it came, thus eliminating the Necromancer's evil



"THE FROG"

ARCADE ACTION

This one will give you hours of exciting play. . Cross the busy highway to the safety of the median and rest awhile before you set out across the swollen river teaming with hidden hazards. Outstanding sound and graphics.



16K MACHINE LANGUAGE \$27.95 TAPE \$30.95 DISK

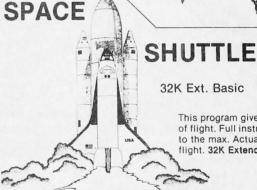
JUNIOR'S REVENGE

Climb vines, avoid obstacles & creatures to save your father from Luigi.

32K CASS \$28.95 32K DISK \$31.95







\$28.95 TAPE \$31.95 DISK

32K Ext. Basic

This program gives you the real feeling of flight. Full instrumentation complete to the max. Actual simulation of space flight 32K Extended Basic

16K MACHINE LANGUAGE TAPE \$27.95 DISK \$30.95

"TRAPFALL"

By KEN KALISH

ARCADE ACTION

The "Pitfalls" in this game are many. Hidden treasures, jump over the pits, swing on the vine, watch out for alligators, beware of the scorpion. Another game for the Color Computer with the same high resolution graphics as "The King."

OTHER GREAT GAMES

PROTECTORS - Exciting fast paced arcade game that looks and plays like the popular arcade game "DEFENDER"

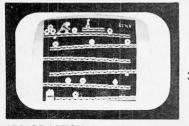
32K Machine Code Tape \$24.95

COLOR GOLF - Now sit at your computer and play nine or eighteen holes. Outstanding graphics in the fairway or on the green. Helps your game.32K Extended Basic

'YAAZEE" (C) 1983 - Yaazee is a 2 player game using five dice to get the best poker hand. After game is loaded flashing digit below player number determines which player rolls dice at the start of the game. 16K Machine Language Ext. Basic

BIRD ATTACK - A fast paced machine language arcade game. Shoot the birdmen before they descend upon you. Watch out for their bombs! 16K Machine Language

MAZE RACE - Maze race is a one or two player game. Play either against the built in timer or against your favorite opponent. 16K Machine



THE KING

32K Machine Language \$26.95 TAPE \$29.95 DISK

ARCADE ACTION - How high can you climb? Four full graphic screens. Exciting Sound - Realistic graphics. Never before has the color computer seen a game like this. Early reviews say: Just like the arcade Simply outstanding!

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SR-71 is a fast action game in which you are the pilot on a mission to take photographs of missile sites in Russia and deliver them to our processing laboratory in Japan.



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S-6 to 8 M - 10 to 12 L 14 to 16 \$2.00 Postage & Handling per order



TELEX 706139

UTILITIES

COLOR MONITOR-Written in position independent code. (May be located in any free memory). Very compact. Only occupies 1174 bytes of memory. Full Featured. Includes Break-Pointing of machine language programs, register display and modify, memory display and modify, and block memory move commands. Displays memory in hex and ascii format on one line 8 **MACHINE LANGUAGE \$24.95** bytes long.

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DISK TO TAPE-Dump the contents of most disks to tape automatically. Machine Language. \$17.95

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phone MAIL LIST-Maintain a complete mailing list with numbers etc. Ext. Basic. DISK BASED \$17.95

PROGRAM PRINTER UTILITY-This program will list basic programs to your printer in two column format. Saves paper and makes your listing look professional. Disk based. \$17.95

EDUCATIONAL SOFTWARE For The Color Computer and TDP 100



STORY PROBLEMS is a program that is designed to give practice in solving STORY PROBLEMS (sometimes called STATEMENT, THOUGHT or WORD PROBLEMS) on the COLOR COMPUTER. It is suitable for use in either a home or school environment. It is also a tool that will allow you to create new story problems to suit your children's needs and ability levels. It has many features that make it particularly attractive: Story problems involving addition, subtraction, multiplication, division or a combination of the four are presented to the student by slowly scrolling each letter of each problem onto the screen. Up to 5 students may use the program at the same time. There are 4, user modifiabale, skill levels. 16K Ext. Basic **TAPE \$19.95**

SPELLING TEST is designed to give a standard oral spelling test using the audio track of the computer's tape recorder to dictate test words and sample sentences. Student responses are typed on the keyboard and checked by the computer. Results are displayed on the screen and (if connected) on a printer.

REQUIRES 16K EXT. BASIC \$19.95

MATH DRILL is a program designed to help children to practice addi-MATH DRILL is a program designed to help children to practice addition, subtraction, multiplication, and division skills on the COLOR COMPUTER. It has several features that make its use particularly attractive.

•Up to 6 students may use the program at the same time.

•Answers for addition, subtraction and multiplication are entered from right to left, just as they are written on paper.

•Commas may be included in the answers.

•Partial products for the multiplication problems may be computed on the screen.

puted on the screen.

Division answers that have a remainder are entered as a whole number followed by the letter "R" and the remainder.

There are ten, user modifiable, skill levels.

A "SMILEY FACE" is used for motivation and reward. Its size increases relative to the skill level.

Skill levels automatically adjust to the student's ability.

A timer measures the time used to answer each problem and the total time used for a series of problems.

· After a problem has been answered incorrectly the correct answer appears under (above in division) the incorrect answer.

REQUIRES 16K EXT BASIC

WORD DRILL is designed to give a multiple choice vocabulary quiz. Words and definitions are entered into the program from the keyboard or from a tape file. The computer displays a randomly chosen definition and eight word choices. The student must enter his response before a built in timer reaches zero.

REQUIRES 16K EXT. BASIC \$19.95

EDUCATIONAL PACKAGE — SPELLING TEST WORD DRILL - MATH DRILL - ESTIMATE -ALL FOR - \$69.95

ESTIMATE is a program designed to help children to practice estimating the answers to addition, subtraction, multiplication and division problems on the COLOR COMPUTER. It has many features that make its use particularly attractive:

Up to 5 students may use the program at the same time.
 There are 5, user modifiable, skill levels.

The acceptable percent error may be changed as a student's skill improves.

A timer measures the number of seconds used to answer each problem and the total time used for a series of problems.
If a problem has been answered incorrectly, the student is told the percent error and asked to try again.
If a problem is answered incorrectly a second time, the student is

told the correct answer and the range of acceptable answers is displayed. A report is given at the end of each set of problems that includes the

number of problems done, the number of problems answered correctly on the first try and the average percent error.

The (BREAK) key has been disabled so that a child will not inadvertently stop the program from running.

16K EXT. BASIC \$19.95

TEACHERS' DATABASE is a program designed to allow a teacher to keep a computerized file of information about his/her students. There are many features that make this program particularly attractive.

• Information on as many as 100 students (or more) may be in the

computer at one time.

Each student may have as many as 20 (or more) individual items of data in his/her record.

The program will run from cassette or disk.

Cassette and disk files are completely compatable.

The program is menu driven.

Records may be easily changed, deleted, combined or added.

· Information about students may be numerical or text.

Records may be quickly alphabetized.
Records may be sorted by various criteria.
Records may be reordered (ranked) based on test scores or other data.

Data displayed during a sort may be printed on a printer or saved on disk or cassette as a new file.
A full statistical analysis of data may be done and sent to the

printer.
• Student test scores may be weighted. 32K EXT BASIC TAPE \$39.95 DISC \$42.95

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Let COCO TYPE Help You Tighten Up That Typing

By Leonard Hyre

ow many CoCo owners shudder with terror at the thought of attempting to enter a long 16K program one hunt and peck stroke at a time. Well, have no fear, CoCoType is here!

I wrote *CoCoType* primarily for my kids. It seemed the most frightening thing about a computer was not the programming, but rather the strange looking collection of numbers and letters. It didn't take long to find out I was more than a bit rusty myself. Soon we were sharing *CoCoType* with other families. They all seemed to be pleased with it, so I want to share it with all of you.

When you run CoCoType you are first treated to opening credits (after all I do have an ego to stroke) and then move on to a menu. The menu offers you a choice of 1) Beginner, 2) Secondary or 3) Advanced. If 1 is chosen, the would-be typist is given a set of practice exercises, one at a time. Typing the exercise correctly four times gets you an appropriate musical reward and a new exercise. The Secondary option is similar, except that we leave the home keys and get on with those tough ones. These are important, especially for computer lovers, since we use all those symbols and numbers. For the Advanced option, the typist is presented with full-line phrases. For typing 24 perfect phrases, the student is graduated with honors and given appropriate respect.

Structure wise, I have kept CoCoType simple. I make liberal use of Extended BASIC's PLAY command to provide lots of whistles, along with musical interludes. The opening credits are controlled in Lines 1-5 and subroutine 6000. On return, we set a series of instructions and a menu. INKEY\$ selection at Line 21 and 22 send us to the various options. Lines 1000-1016 set up option 1 and then send the program

(Leonard Hyre, a claims representative for the Social Security Administration, has two CoCo programs on commercial market Harness Handicapper and Thoroughbred Handicapper with Federal Hill Software. He also has had a game published.)

to subroutine 4000 which is shared by option 2. If option 2 is selected, Lines 2000-2014 take over. The routine for option 3 is independent of the others and is set up and run within Lines 3000-3047. Lines 3055-3067 provide the "graduate" with an appropriate reward for his hard work.

By the way, if you are the one needing the typing lessons and thus are intimidated by the length of this program, I'll be happy to send you a copy on tape for \$6. Just send your request to me at: Leonard Hyre, P.O. Box 403, Cambridge, MD., 21613.

If you like *CoCoType*, drop me a line. I promise my head won't swell beyond recognition. If you aren't thrilled and have an improvement in mind, I can also take mild criticism if it is done gently. Thanks for your interest. Have fun! Now, where is that 32K Adventure program I want to type in?

13.....02A2 1002...04A7 2008...07FD 3008...0B81 3036...0E44 3080...10B3 END...12BC

The listing:

1 CLS:DIMA\$(18),B\$(26):PRINTSTRI NG\$(32,168); 2 PRINTSTRING\$(10,168)+" COCOTYP ING "+STRING\$(10,168);:PRINTSTRI NG\$(32,168); 3 PRINTSTRING\$(8,207)+"by"+STRIN G\$(2,128)+"leonard"+CHR\$(128)+"h yre"+STRING\$(8,207);:PRINTSTRING \$(32,207):PRINTSTRING\$(32,175) 4 GOSUB6000:PRINT@448,"***PRESS ANY KEY TO CONTINUE***"; 5 PLAY"T15005V31GGGGG"

```
6 Is=INKEYs: IFIs=""THEN6
7 PLAY"T15005V3100000"
10 CLS: PRINTSTRING$ (32, 159); :PRI
NT"THIS PROGRAM IS DESIGNED TO G
IVEYOU A NUMBER OF BASIC TYPING
   EXERCISES TO GET YOU STARTED
ON THE WAY TO BECOMING A CAPABLE
   TYPIST.";
11 PRINT: PRINT"THE SECRET IS TO
KEEP YOUR EYES ON THE SCREEN--NO
T ON THE KEYS. KEEP YOUR FINGERS
 ON THE 'HOME KEYS' . THESE ARE--
-ASDF (LEFT) & JKL; (RIGHT);"
13 PRINTSTRING$ (32, 159) ; :PRINT"*
****PRESS ANY KEY TO START****
;:PRINTSTRING$ (32, 159);
14 I$=INKEY$: IFI$=""THEN14
15 CLS:PLAY"T200V3105FGGF"
16 PRINTSTRING$ (32, 175):PRINT:PR
INT: PRINTSTRING$ (32, 207); :PRINT"
**LEVEL SELECTION**
";:PRINTSTRING$(32,207):
17 PRINTTAB(10) "1> BEGINNER"
18 PRINTTAB(10) "2> SECONDARY"
19 PRINTTAB(10) "3> ADVANCED"
20 PRINTTAB(10) "<CHOOSE 1-3>"
21 Is=INKEYs: IF Is=""THEN 21
22 IF I = "1"THEN1000ELSEIFI = "2"
THEN2000ELSEIFI = "3"THEN3000ELSE
21
23 END
1000 CLS: PRINT"BELOW ARE SEVERAL
 EXERCISES TO GET YOU FAMILIAR
               COMMONLY USED KEY
WITH THE MOST
S. "
1002 PRINT"YOU WILL BE GIVEN THE
M 1 AT A TIME. TO MOVE TO THE N
EXT ONE YOUMUST TYPE THE CURRENT
 SELECTION CORRECTLY 4 TIMES."
1003 PRINTTAB(6)"1> ASDF"
1004 PRINTTAB(6) "2> JKL; "
1005 PRINTTAB(6)"3> TGUH"
1006 PRINTTAB(6)"4> QWEV"
1007 PRINTTAB(6)"5> POIN"
1008 PRINTTAB(6)"6> BRNY": PRINTT
AB(6)" < PLUS 12 MORE>"
1009 PRINT" ** ** < PRESS ANY KEY TO
 START>***"; : PLAY"T150V3105GGGG"
1010 I$=INKEY$: IF I$=""THEN1010
1011 PLAY"T150V3105GGGG"
1012 A$(1)="SFAD":A$(2)="FADS":A
$(3)="KJL;":A$(4)="J;LK":A$(5)="
GHTU": A$ (6) = "UGHT"
1013 A$(7)="WEVN":A$(8)="VEWQ":A
$(9)="INOP": A$(10)="PINO": A$(11)
="XZTR": A$ (12) = "BRNY"
1014 A$(13)="CLOD": A$(14)="SEKP"
:A$(15)="TYUI":A$(16)="REOP":A$(
17) = "MVWH": A$ (18) = "DALK"
1015 FOR X=1 TO 18:GOSUB4000:NEX
```

TX 1016 GOTO 15 2000 CLS:PLAY"T150V3105GGGG":PRI NT"BELOW ARE SEVERAL INTERMEDIAT EXERCISES. AS IN THE BEGINNE R EXERCISES, THEY ARE BASICALLY FOR LEARNING KEY LOCATION. 2001 PRINT: PRINT" EXERCISES INCLU DE: " 2002 PRINTTAB(4)"1> A1S2D3F4" 2003 PRINTTAB (4) "2> T56Y7K86" 2004 PRINTTAB(4)"3> R-/.K-0" 2005 PRINTTAB(4)"4> CATJOBTIP" 2006 PRINTTAB(4)"5> EXCLAIMIT" 2007 PRINTTAB(4)"6> !WXV()\$" 2008 PRINTTAB(4)"-AND 12 MORE!" 2009 PRINT: PRINT" < PRESS ANY KEY TO START>" 2010 Is=INKEYS: IF Is=""THEN2010 2011 PLAY"T150V3105GGGG": A\$(1)=" A1S2D3F4"; A\$(2)="T56Y7K86"; A\$(3) ="R:/.K-0":A\$(4)="CATJOBTIP":A\$(5) = "EXCLAIMIT": A\$ (6) = "!W%V() \$" ": A\$(7)="A; SLDKFJ": A\$(8)="IEQUAY": A\$(9)="9ECLIDS" 2012 A\$(10)="QPWOEI": A\$(11)="RAZ ELBOP": A\$ (12) = "FELKROLO": A\$ (13) = "KRIPNIC": A\$ (14) = "DANLOUP": A\$ (15) = "ARKNORP" : A\$ (16) = "POINTER" : A\$ (17) = "THRISG": A\$ (18) = "FLIPGUT" 2013 FOR X=1 TO 18:GOSUB 4000:NE XT X 2014 GOTO15 3000 CLS:PLAY"T150V3105GGGG":PRI NT STRING\$ (32, 175); 3001 PRINTSTRING\$ (12,175) + "ADVAN CED"+STRING\$ (12, 175); 3002 PRINTSTRING* (32, 175) 3004 PRINT"YOU WILL BE GIVEN A S HORT PHRASEOR SENTENCE TO TYPE.T YPE AS FASTAS YOU CAN BUT TYPE A CCURATELY." 3005 PRINT: PRINTSTRING\$ (32, 128); 3006 PRINTCHR#(128)+"<PRESS ANY KEY FOR 1ST PHRASE>"+CHR\$(128):: PRINTSTRING\$ (32, 128); :PRINT"YOU MUST TYPE 24 PERFECT PHRASES";:P RINTSTRING\$(32, "*");:PRINT"TIMER STARTS WHEN PHRASE APPEARS"; : PR INTSTRING\$ (32, "*") 3007 TY=0: I == INKEY =: IF I == "THEN 3007 ELSE CLS: PLAY"T255V3105EFEF EF" 3008 E\$(1)="NOW IS THE TIME FOR ALL GOOD MEN" 3009 E\$(2)="EVERY GOOD BOY WILL HAVE HIS DAY" 3010 E\$(3)="THERE IS NOTHING STO PPING ME NOW"

3011 E\$(4)="ROSES ARE RED-VIOLET

S ARE VIOLET" 3012 E\$ (5) = "MANY A GOOD MAN HAS GONE ASTRAY." 3013 E\$(6)="I LOVE TO TYPE WITH MY OWN COCO" 3014 E\$(7)="THE SLY FOX WILL GET THE CHICKEN" 3015 E\$(8)="COMPUTERS ARE NOT AC TUALLY SMART" 3020 FOR Z=1 TO 3:FOR X=1 TO 8 3021 PRINTSTRING\$ (32, 175); 3022 PRINT"YOUR PHRASE IS-" 3023 PRINT:PRINTE\$(X) 3024 PLAY"T150V31050GGG" 3030 TIMER=O:LINE INPUT ANS 3031 IF ANS=ES(X) THEN PLAY"T403L 15P2004CP2004CP20EP20L12CP10L24E P20L36": GOT03036 3034 IF AN\$<>E\$(X)THEN SOUND 1.4 :PRINT:PRINT:PRINT" *** *** R 3036 PRINT:PRINT:PRINT"****** 1: PRINT@420, "PERFECT PHRASES SO FAR= "TY:PRINT" ** YOUR SPEED WAS ";FIX(3600/TIMER)*9;"WORDS/MIN"; 3040 FOR DL=1 TO 1600:NEXT DL 3041 CLS: IF TY=24 THEN 3055 3045 NEXT X:NEXTZ 3046 CLS

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3047 IF TY<24 THEN3008 3050 END 3055 CLS:PRINT:PRINTSTRING\$ (32.1 75);:PRINT"IN HONOR OF YOUR PLETION OF ALL REQUIRED EXERCISE S YOU ARE HEREBY GRADUATED AND AWARDED A GOLD MEDAL!":PRINTSTR ING#(32.159);:FOR DL=1 TO 1000:N EXT DL 3056 PMODE 1,1:8CREEN 1.0:PCL8 3057 DRAW"C2BM96.96U20L7R15" 3058 DRAW"C2BM116,96;U20D10R10U1 OD20" 3059 DRAW"C2BM136,96;U20R10L10D1 ORIOLIODIORIO" 3060 DRAW"C2BM96,126;U20R10L10D1 ORIOLIODIORIO" 3061 DRAW"C2BM118,126;U20F20U20" 3062 DRAW"C2BM146,126;U20R7F5D10 G5L7" 3063 CIRCLE(60,100),25,2 3064 PAINT(60,100),2,2:CIRCLE(60 ,100),20,3 3065 DRAW"BM60,145; G4BE4D40R4BRL 4L4" 3066 LINE(50,140)-(70,190),PSET, 3067 LINE(60,140)-(60,125).PSET 3080 **GDTD308**0 4000 CLS:TI=0:PRINTSTRING\$(32,"* ") 4001 PRINT@64, "HERE IS YOUR EXER CISE: ": PRINT@96, CHR\$ (128) +A\$ (X) + CHR\$ (128) 4002 PRINT@128, "TIMES PERFECT="T 4005 PRINT@192, "TYPE: ": INPUTAN*: IFAN==A=(X)THENTI=TI+1 4006 IF ANS=AS(X)THENPRINT@128." TIMES PERFECT=";TI:SOUND125.1 4007 IF AN\$<>A\$(X)THENSOUND 1.1 4008 FOR DL=1 TO 20:NEXT DL 4009 PRINT@192," ": IF TI<4 THEN 4005 4010 IF TI=4 THEN PLAY"T203L16CP 1602L32GP32GP32L8AGP9L16BP1603C" :IF TI=4 THEN RETURN 5999 END 6000 DATA A,,B,E,G,I,N,N,I,N,G,, T,Y,P,I,N,G,,P,R,O,G,R,A,M 6002 PR=259 6004 FORX=1T026 6006 READ B\$ 6008 PRINTEPR, B#; 6010 PLAY"T255V3102EE" 6012 FORDL=1T050: NEXTDL 6014 PR=PR+1 6016 NEXTX 6018 RETURN



Hamburgers, fries, drinks and other fastfoods are chased by chattering teeth. Can you stop them before you go...WACKO? Three levels of play from beginner to expert. This is number one for fun. 32K Disk \$24.95



Armed with laser cannons guide your desert vehicle past obstacles while avoiding enemy fire. Watch out not to run out of fuel. Five levels of play.
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32K Cass. \$24.95





Push blocks of ice to crush giant mosquitos and avoid getting stung long enough to get them all. Three levels with graphics so real you'll want your fly swatter. Don't miss this arcade classic.

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You are in a foodfight against the evil chefs. Can you eat the icecream cone before it melts? Fast paced arcade action and sound make this game unforgettable. Fifteen screens and ten levels o
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All games 32K disk or cassette are written completely in machine language. Highest resolution artifact graphics and spectacular sound effects are just two of the exceptional features you will find. Each game records high score and multiple skill levels with play features comparable to current arcade games.

Other works by this author

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A Beginner's Guide To Cassette Files

By Bob Albrecht Rainbow Contributing Editor

Fantasy Role Playing Games

Millions of young people, and many not-so-young, are playing fantasy role playing games. A role playing game is a game in which one or more players create and control characters (adventurers) who live their imaginary lives in a specially made game world. The game world is created, managed, and operated by a GameMaster (GM), also called a referee, adventure master, or dungeon master (DM). Most people who play role playing games use a formal rule system. Some of the best known are shown below.

Champions. From Hero Games, 92A 21st Avenue, San Mateo, CA 94402.

Dungeons & Dragons (D&D). From TSR Hobbies, P.O. Box 756, Lake Geneva, WI 53147.

RuneQuest (RQ). From Chaosium, P.O. Box 6302, Albany, CA 94706.

Tunnels & Trolls (T&T). From Blade, Box 1467, Scottsdale, AZ 85252.

Worlds of Wonder (WOW). From Chaosium, P.O. Box 6302, Albany, CA 94706.

BEGINNERS BEWARE! The rule books are very difficult to understand. If you are a beginner, first try Worlds of Wonder or Tunnels & Trolls. Programs in "GameMaster's Apprentice" are based on the game system used in Worlds of Wonder and RuneQuest. For general information about fantasy role playing games, try the following book, excellent for beginners.

Through Dungeons Deep by Robert Plamondon. From Reston Publishing Company, 11400 Sunset Hills Road, Reston, VA 22090.

Copyright (c) 1983 by DragonQuest, P.O. Box 310, Menlo Park, CA 94025. Portions of "GameMaster's Apprentice" are from a book-in-progress called Adventurer's Handbook: A Beginner's Guide to Role Playing Games by Bob Albrecht and Greg Stafford. To be published January, 1984 by Reston Publishing Company, 11400 Sunset Hills Road, Reston, VA 22090.

erhaps you have used the cassette recorder to load cassette programs into memory, using the CLOAD command. You may also have used the cassette recorder to CSAVE your own programs on cassette tapes or to make backup copies of cassette programs which you have purchased. It is okay to make copies of copyrighted software that you have purchased for your own use. It is not okay to make copies to sell or give to others. This is unfair to people who invest their time and money to provide good, inexpensive software and is illegal as well.

• When you *CSAVE* a program, the CoCo records the program from its memory onto a cassette, using the cassette recorder.

CSAVE: FROM MEMORY TO TAPE

MEMORY

• When you *CLOAD* a program, the CoCo reads the program from a cassette into its memory, again using the cassette recorder.

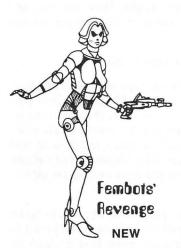
CLOAD: FROM TAPE TO MEMORY

MEMORY

You can also use the cassette recorder to store data (information) on cassettes and read data from cassettes into the CoCo's memory. The data can consist of numbers or strings or a mixture of both. So, this information can be

(Bob Albrecht and George Firedrake are two of the most prolific authors in the microcomputer world today. Specialists in writing for beginners, they are authors of numerous books, including TRS-80 Color BASIC.)

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anything you wish to store. For example:

- A personal telephone directory with people's names and their phone numbers.
- A dictionary of three-letter words to be used in a computer game.
- An inventory of your record, coin, or stamp collection —or whatever you collect.
- •A list of your important personal property. Put this cassette in your bank deposit box. You might need it if your house burns down or you are burgled!
 - •The first 500 prime numbers.
- •Your shopping list for next Christmas (add to it now and then).
- •People's birthdays, anniversaries, and other important
- Tax information so you and your friendly CoCo can go bravely into battle against the giant IRS monster.
- Character records for characters in fantasy role playing games.
- A history of a character's progress as she or he grows and learns while adventuring in the GameMaster's World.
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- •Specifications and prices of weapons, shields, armor, and other artifacts of conflict available in The Weapon Shop of Rehsu.
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 - •And so on—what do you want to store?

Why put such information on tape cassettes? Because, once it is on cassettes, you can quickly read it into your CoCo and do things with it or to it, as the case may be. Information stored on cassette tape is "machine readable." The CoCo automatically reads it much faster (and with fewer errors) than you can type it in. So, save wear and tear on your fingers—learn how to put data on cassette tapes.

It's Easy!

Start with two short, simple programs. The first program lets you enter information from the keyboard and save it on tape. Of course, this information must first go into the memory of the CoCo. That's why we call this program KEYBOARD-MEMORY-TAPE.

Our program helps you store names on a cassette tape. Well, if you want to store a string that is not a name, that's okay. The CoCo doesn't care. First, we clear the screen and tell the CoCo we want to OPEN a file for output ("O"). Output to where? To the cassette recorder (-1), of course. And what shall we call this file? We do believe an appropriate name would be "NAMES."

100 REM**KEYBOARD-MEMORY-TAPE

110 CLS

120 OPEN "NAMES"

Open for output to cassette

a file named

Line 120 is written for Extended Color BASIC. If you are using Color BASIC, write Line 120 as follows.

120 OPEN "O", #-1, "NAMES"



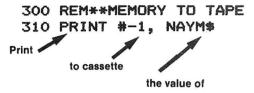
"Ah," purrs CoCo, "my esteemed human wants me to open a file drawer and call it NAMES. Perhaps she or he will then supply me with names to put into NAMES."



Indeed, CoCo, we will add to your program so your human can enter names from the keyboard and you can store them in your open file called NAMES. The next piece of our program prompts your human to enter a name.

200 REM**KEYBOARD TO MEMORY 210 INPUT "NAME"; NAYM\$

The CoCo waits patiently until its human types a name (or any string) and presses [ENTER], then it outputs (writes, records . . .) whatever was typed onto the cassette tape.



What next? We need a way to tell the CoCo that we are finished entering names and to please CLOSE the file and stop.

400 REM**DO AGAIN IF NOT ENDFILE 410 IF NAYM\$<>"ENDFILE" THEN 210 420 CLOSE -1 430 STOP

If the value of NAYM\$ is not ENDFILE, the CoCo goes back to Line 210 and asks for another name. If you enter ENDFILE as the name, the CoCo puts it on the cassette tape then, thanks to Line 410, goes on to Line 420, closes the file, and stops. The last thing on the cassette will be ENDFILE, followed by an End-Of-File (EOF) mark. If you are using Color BASIC instead of Extended Color BASIC, change Line 420 to: 420 CLOSE #-1.

100 REM**KEYBOARD-MEMORY-TAPE

110 CLS

120 OPEN "O", -1, "NAMES"

200 REM**KEYBOARD TO MEMORY

210 INPUT "NAME"; NAYM\$

300 REM**MEMORY TO TAPE

310 PRINT #-1. NAYM\$

400 REM**DO AGAIN IF NOT ENDFILE

410 IF NAYM\$<>"ENDFILE" THEN 210

420 CLOSE -1

430 STOP

Try The Program . . . Carefully!

Enter the program and try it. Do this carefully. We wish you success on your very first try. S l o w is good.

Start by finding a high quality, never-before-used tape cassette. Don't (repeat: DON'T) use just any old cheap cassette. Treat your CoCo to the best, if you want the best

Next, examine the cassette. Most cassettes have lots of magnetic tape and . . . very important . . . a few inches of leader. Leader? Rewind the tape. The first few inches probably consist of *non-magnetic* leader, usually clear plastic, or yellow, or red, or blue, or any color other than dull brown. Dull brown is the color of magnetic tape.

YOU CAN'T RECORD ON LEADER

Is the program in memory? Yes? Good. Pop the cassette into the recorder.

- Rewind the cassette.
- Then, run it forward a few inches so magnetic tape, not leader, is in position to receive your data.

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- •Press both [PLAY] and [RECORD] on the cassette recorder. Nothing should happen. If the tape starts to move, you probably don't have the recorder properly hooked up to the CoCo.
- •Set the volume control on the cassette recorder to 4 or 5 or whatever works when you use *CSAVE* and *CLOAD*.
- •Type *RUN* and press [ENTER]. The record light will come on briefly on the recorder and the tape will move as the CoCo opens the file. Soon the screen looks like this.

This is what you see:

NAME .

•Type a name and press [ENTER]. You can enter the name of your choice, then type ENDFILE as the last name. When you enter ENDFILE, the CoCo will write the names on the tape—you will see the record light come on and the tape move. Here is what happened when we entered names.

NAME? ALOYSIOUS NAME? BAROSTAN NAME? BRIDLA NAME? DERNFARA NAME? JOLEEN NAME? ROKANA NAME? RURIK NAME? ENDFILE BREAK IN 420 OK

TAPE MEMORY TO SCREEN

We also wrote a program to read the names from the cassette tape and put them on the screen. First, we OPEN a cassette file for input.

500 REM**TAPE-MEMORY-SCREEN
510 CLS
520 OPEN "I", -1, "NAMES"

Open for input

from cassette

a file named

If you are using Color BASIC, change Line 520 to:

520 OPEN "I", #-1, "NAMES"

Next, check for End-Of-File (EOF). If EOF has been reached, go to Line 910 and close the file. Otherwise, input a name from the cassette and store it as the value of NAYM\$.

600 REM**TAPE TO MEMORY 610 IF EOF (-1) THEN 910 620 INPUT #-1, NAYM\$

Print the name on the screen and go back for more.

700 REM**MEMORY TO SCREEN 710 PRINT NAYM\$

800 REM**GO FOR ANDTHER 810 GOTO 610 When the CoCo reads the End-Of-File mark, Line 610 sends it to Line 910.

900 REM**CLOSE THE FILE 910 CLOSE -1 920 STOP

For Color BASIC: 910 CLOSE #-1

Here are both programs.

100 REM**KEYBOARD-MEMORY-TAPE

110 CLS

120 OPEN "O", -1, "NAMES"

200 REM**KEYBOARD TO MEMORY

210 INPUT "NAME"; NAYM\$

300 REM**MEMORY TO TAPE 310 PRINT #-1, NAYM\$

400 REM**DO AGAIN IF NOT ENDFILE

410 IF NAYM\$<>"ENDFILE" THEN 210

420 CLOSE -1

430 STOP

500 REM**TAPE-MEMORY-SCREEN

510 CLS

520 OPEN "I", -1, "NAMES"

600 REM**TAPE TO MEMORY

610 IF EDF (-1) THEN 910

620 INPUT #-1, NAYM\$

700 REM**MEMORY TO SCREEN

710 PRINT NAYMS

800 REM**GO FOR ANOTHER

810 GOTO 610

900 REM**CLOSE THE FILE

910 CLOSE -1

920 STOP

To run KEYBOARD-MEMORY-TAPE

•Position the cassette and set the volume.

• Press [RECORD] and [PLAY] on the recorder.

•Type RUN and press [ENTER].

To run TAPE-MEMORY-SCREEN

• Position the cassette and set the volume.

• Press [PLAY] on the recorder.

•Type RUN 510 and press [ENTER].

Remember, Lines 120, 420, 520, and 910 work in Extended Color BASIC. If you are using Color BASIC, put a number sign (#) in front of the device number (-1) in each of these statements.





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1HE

MEMORY

by Michael Popovich

ave you ever played the popular concentration card game where, by placing 52 playing cards face down, you must try to match two cards at a time by turning them over simultaneously? Well, here's a fun game based on the same concept called *The Memory Game*, requiring two players.

When the program is run, forty squares appear on the screen. The CoCo takes a few seconds to set up the grid, placing 20 matching letters randomly behind the 40 squares. When this is done, the screen will flash and a small verticle line will appear at the top of the screen. This signals player one. If player one gets a match, he/she wins an extra turn and one vertical line will remain. If the player doesn't make a match, the squares will be covered and two verticle lines will appear signifying player two's turn. The score will be displayed at the end of the game.

The small red square, identifying the player's move, is placed inside the larger square in the upper left corner of the grid. It can be moved as follows:

Q - Up

A - Down

P — Left

@ - Right

L — Look at what is behind the square.

200....01BA 330...045B 580...07B3 END...0B01

The listing:

1 ' BY MICHAEL POPOVICH
3 ' 6 ALEX CIRCLE
5 ' NASHUA NH 03062

7 '

10 T=0:MM=1:Z=1

(Michael Popovich is a student at Keene State College. This is his first publication and he hopes to have more.) 20 DIM L(50), B\$(25)

30 PMODE 3,1:PCLS:SCREEN 1,0

40 FOR A=0 TO 220 STEP 30

50 FOR C=40 TO 160 STEP 30

60 LINE (A,C)-(A+20,C+20),PSET,B

70 PAINT (A+2,C+2),2,4

80 LINE(8+A,8+C)-(13+A,13+C),PRE

SET, BF

90 NEXT C

100 NEXT A

110 LINE (8,48)-(13,53), PSET, BF

120 R=RND(40)

130 T=T+1

140 IF T=41 THEN 210

150 L(T)=R

160 IF T=1 THEN 120

170 FOR M=1 TO T-1

180 IF L(M)=R THEN T=T-1:GOTO 12

0

190 NEXT M

200 GOTO 120

210 PL=1:SOUND 50,1:SCREEN 1,1:F

OR W=1 TO 100:NEXT W:SCREEN 1,0:

DRAW "BM123,5; D10"

220 A\$=INKEY\$

230 IF A\$="L" GOSUB 340

240 IF A\$="P" AND ZX=0 THEN LINE (8+X,48+Y)-(13+X,53+Y), PRESET, BF

:X=X-30:J=1:Z=Z-1:ELSE IF A=="P

" AND ZX=1 THEN X=X-30:J=1:Z=Z-1 250 IF A\$="@" AND ZX=0 THEN LINE

(8+X,48+Y)-(13+X,53+Y), PRESET, BF

:X=X+30:J=1:Z=Z+1:ELSE IF A\$="@"

AND ZX=1 THEN X=X+30:J=1:Z=Z+1

260 IF A\$="A" AND ZX=0 THEN LINE

(8+X, 48+Y) - (13+X, 53+Y), PRESET, BF

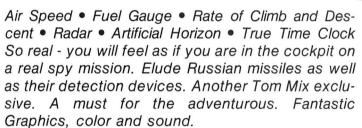
:Y=Y+30:J=1:Z=Z+8:ELSE IF A\$="A"

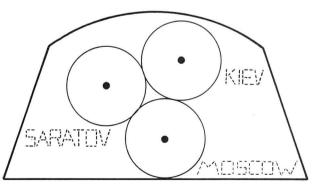
AND ZX=1 THEN Y=Y+30:J=1:Z=Z+8

270 IF A\$="Q" AND ZX=0 THEN LINE

RUSSIAN SPY MISSION

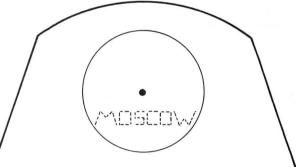
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AND ZX=1 THEN Y=Y-30:J=1:Z=Z-8 280 IF X<0 THEN X=0: Z=Z+1 290 IF X>210 THEN X=210: Z=Z-1 300 IF Y<0 THEN Y=0: Z=Z+B 310 IF Y>120 THEN Y=120: Z=Z-8 320 IF J=1 THEN LINE (8+X, 48+Y)-(13+X,53+Y), PSET, BF: J=0: ZX=0 330 GOTO 220 340 ZZ=L(Z) 350 X\$=STR\$(X+6):Y\$=STR\$(Y+45) 360 X1\$=STR\$(X1+6):Y1\$=STR\$(Y1+4 5) 370 IF ZZ>20 THEN ZZ=ZZ-20 380 DN ZZ GOTO 390,400,410,420,4 30,440,450,460,470,480,490,500,5 10,520,530,540,550,560,570,580 390 B\$="BD3D12U12E3R4F3D12U7L9": GOTO 590 400 B\$="BR3G3D9F3R4E3U2H3L4R4E3U 2H3L4": GOTO 590 410 B\$="BR3G3D9F3R4E3BU9H3L3":G0 TO 590 420 B\$="R7F3D9G3L7U14":GOTO 590 430 B\$="R10L10D7R8L8D8R10":GOTO 590 440 B\$="R10L10D7R8L8D8":GOTO 590 450 B\$="BR3G3D9F3R4E3U2L3R3BU7H3 L4": GOTO 590 460 B\$="D15U8R10U7D15":GOTO 590 470 B\$="R9L5D15L4R9":GOTO 590

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480 B\$="BD12F3R4E3U12":60T0 590 490 B\$="D15U8R2E7G7F8":GOTO 590 500 B\$="D15R10":GOTO 590 510 B\$="D15U15R6D9U9R6D15":GOTO 590 520 B\$="D15U15F10U10D15":GOTO 59 530 B\$="BR3G3D9F3R4E3U9H3L4":GOT 0 590 540 B="BD3D12U12E3R4F3D2G3L4":G OTO 590 550 B\$="BD3D12U12E3R4F3D2G3L4F8" :GOTO 590 560 B\$="R9L5D15":GOTO 590 570 B\$="D13F2R6E2U13":G0T0 590 580 B\$="D3F9D3U3H5G5D3U3E9U3":GD TO 590 590 FOR G=1 TO V 600 IF B\$=B\$(G) THEN SOUND 1.1:R **ETURN** 610 NEXT G 620 LINE(8+X,48+Y)-(13+X,53+Y),P RESET, BF: ZX=1 630 PAINT (8+X,48+Y),1,4 640 DRAW "S3": DRAW "BM"+X\$+", "+Y \$+"BD1":DRAW B\$ 650 AA=AA+1 660 IF AA=1 THEN C\$=B\$:X1=X:Y1=Y 670 IF AA=2 AND C\$=B\$ AND X=X1 A ND Y=Y1 THEN SOUND 1,1:AA=AA-1:R ETURN 680 IF AA=2 AND C\$=B\$ THEN PAINT (2+X, 48+Y), 2, 4: PAINT (2+X, 48+Y) ,1,1:PAINT (2+X1,48+Y1),2,4:PAIN T (2+X1,48+Y1),1,1:AA=0:V=V+1:B\$ (V)=B\$:J=1:ELSE 710 690 IF PL=1 THEN P1=P1+1:PL=2:DD NE=DONE+1:GOTO 750 700 IF PL=2 THEN P2=P2+1:PL=1:D0 NE=DONE+1:GOTO 750 710 FOR H=1 TO 500:NEXT H 720 DRAW "S3":DRAW "C1":DRAW "BM "+X\$+"."+Y\$+"BD1":DRAW B\$:DRAW " BM"+X1\$+","+Y1\$+"BD1":DRAW C\$:DR AW "C4" 730 PAINT (8+X,48+Y),2,4:PAINT (8+X1,48+Y1),2,4:AA=0 740 LINE(8+X,48+Y)-(13+X,53+Y),P RESET, BF: LINE (8+X1, 48+Y1) - (13+X1 ,53+Y1),PRESET,BF:J=1 750 IF PL=1 THEN PL=2:DRAW "BM12 3,5;D10":DRAW "BM133,5;D14":GOTO 770 760 IF PL=2 THEN PL=1:DRAW "C1": DRAW "BM133,5; D14": DRAW "C4" 770 IF DONE=20 THEN CLS:PRINT @1 92, "PLAYER 1 - "P1: PRINT @256, "PL AYER 2 -"P2:END 780 RETURN

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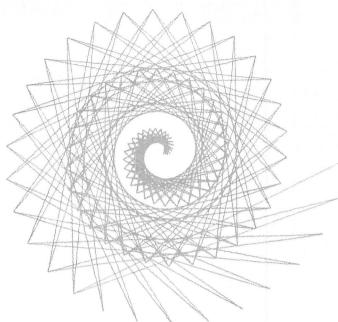


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THE CGP-115 PRINTER:

'A Considerable Upgrade'

By Thomas Szlucha

ver since early man first sketched paintings on the walls of his caves, he has been recording his ideas, feelings and dreams in some permanent fashion for later use. Modern man, with his Color Computer, also has this need for permanent storage. This need for hard copy is so important that many experts differentiate "toy" computers from "personal" computers by the availability of a printer on the system.

Radio Shack's small printer/plotter, the Color Graphics Printer (CGP-115), represents a considerable upgrade to the simple tools the cave man used for his work. Seriously, the CGP offers basic printing functions along with excellent graphics plotting. With the exception of serious word processing, this printer offers considerable performance in a small package at an affordable price (\$249 in the 1983 Radio Shack Catalog — watch for sales).

The CGP-115 is being marketed by Tandy to be used with their entire line of computers. It has a standard parallel as well as a four-pin serial interface, a la CoCo. Unpacking, interfacing and setting up the printer takes about three minutes if you are slow. There is a set of dip switches on the back panel that allows programming for the particular application. For the Color Computer, these switches are set for serial input, 40 or 80 column text character size, line feed with carriage return, and 7 bit ASCII code.

The printer is small, about 8" x 8" x 3", using a 41/2" wide roll of plain paper. Printed characters are formed by moving a small ballpoint pen in the horizontal direction while a roller platen moves the paper up and down vertically. The quality of the printing is excellent, in fact, the 80 column character set produces about 20 characters per inch which are very crisp and easy to read. The print quality by far exceeds that of the typical dot matrix printer, a definite plus for the CGP. Colors (black, red, green, blue) are provided by four pens built into a turret-like "print head." There are switches for power on, paper feed, color select, and pen change as well as a power on indicator light. At start-up, the printer goes through a routine of drawing four small squares, one with each pen, to verify that the ink is flowing properly. Holding the paper feed switch down during startup results in a test printing of the character set. Figure 1 shows a test printing of the character set in the 40 column mode. The normal ASCII character set is supported with lowercase having true descenders.

!"#\$x&'()*+,-./0123456789:;<=>?@ABCDE
FG HIJKLMNOPQRSTUUWXYZ[\]^_'abcdef9hi

Jklmno pgrstuvwxyz{¦}~⊠

Figure 1

The printer defaults to the text mode after start-up with

(Thomas Szlucha, a project manager at Xerox Corp., is a frequent contributor to **the Rainbow**. His hobbies include free-lance software writing.)

the character size determined by the position of the DIP switch on the back panel. The control codes which are available in this mode are shown in Table 1. These are sent to the printer with the PRINT #-2, CHR\$ (X) command in Color BASIC. Backspacing allows the capability of underlining and overstriking; reverse feed allows superscripting. Print speed in the text mode is claimed to be 12 cps, very slow. This slowness definitely trades off against quietness. You can't find a printer much quieter than the CGP.

Control Code	Function
CHR\$ (08)	Backspace
CHR\$ (10)	Line
CHR\$ (11)	Reverse linefeed
CHR\$ (13)	Carriage return
CHR\$ (17)	Set text mode
CHR\$ (18)	Set graphics mode
CHR\$ (29)	Change colors

Table 1

The most exciting part of this printer is the graphics mode. A graphics plotter such as this is expected to have a comprehensive set of plotting commands, which it does. Commands are provided which allow you to draw from one point to another based on a 480 x 480 step grid pattern. You are able to specify position either relative to the current pen location or from a previously specified origin. Lines can be solid or varying degrees of "dashed." You can move the pen without drawing and change colors. There is also a command that draws the axis of a graph including the little "tic" marks along the side. The printer is capable of .2mm/step resolution (.0079"). This is so fine that closely drawn line patterns can exhibit moire patterns.

Unlike Color Computer graphics, the text capability with the CGP in the graphics mode is actually an enhancement over the normal text mode. There are commands to specify the written text size from 80 to one character per line. You are also allowed to rotate the text, ie, it can be normal, going sideways-down the sheet, sideways-up the sheet and upside-down.

The graphics functions used by the CGP are not identical to those provided by Extended Color BASIC. To draw a line on the screen with the Color Computer you can use the line command.

LINE (X1,Y1)-(X2,Y2), PSET

The CGP equivalent would be:

PRINT #-2, MX1,Y1" -move to X1,Y1
PRINT #-2, "DX1,Y1,X2,Y2" -draw to X2,Y2

It takes some familiarity but once mastered, the results can be quite spectacular.

The CGP comes with a 45-page operating manual that does a good job of explaining each command and gives many simple examples. Some previous knowledge of BASIC is assumed. If you decide to purchase the CGP, do pay attention to the technique described in the manual to change the pens. The printhead and surrounding mechanisms are somewhat delicate. I inadvertently bent a small, but important metal tab used to index the various pen colors with my fat thumb before realizing it. (These units are put together by people with very small hands.)

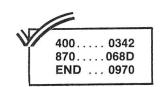
I discovered a very useful trick not described in the operating manual that I would like to share. It can be quite useful

to run the graphics portion of the program in the text mode. In doing so, a line by line description of the graphics commands sent to the printer are listed on the printer along with the value of any associated variables. With this listing it can be relatively easy to spot mistakes, such as missing commas, which can wreak havoc with a piece of graphics art.

I have experienced only a few minor irritations with the CGP. During the power-up routine the pen holder is driven to the left frame and continues to attempt to move. This results in a grinding noise. Consultation with the local Radio Shack computer center indicates that this is a process needed to register the pen servo. Radio Shack should have given a warning about this noise so that new owners would not think they had a lemon on their hands. Another minor complaint is the lack of a circle command. This can be gotten around with a considerable sacrifice in speed by using a subroutine which draws a circle from line segments. This could have been easily built in as a command. My final complaint is that the pens are too small to hold much ink, therefore frequent servicing is required.

The attraction of color printing and plotting make the CGP-115 an ideal first printer for the CoCo owner in need of a hard copy device. If you have printer that you use for word processing and listings, you may be attracted to it as I was for its graphics capabilites.

The program listing included with this review is entitled *Doodler*. It is a fun and perhaps useful program which exercises many of the functions which are available with the CGP-115. The pen is moved around the plotting area with a joystick. Please note that the pen movement is not as fast as you can move the joystick. This may cause some frustration if you are trying to move to a specific location. The easiest way to position the pen is to use the coordinate positions printed on the screen as a guide. With this program, lines can be drawn as well as circles and boxes. Text of any size and orientation can be put where you position the pen, and of course, this can all be done in different colors. Have fun using your computer to design a micro-plotter collage.



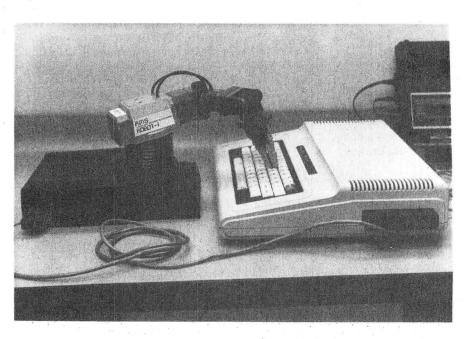
The listing:

10 CLS 20 PRINT@197, "COLOR GRAPHICS DOO DLER" 40 FOR T=1 TO 1000:NEXT 50 PRINT#-2, CHR\$ (18) 55 PRINT#-2,"I" 40 C=0 70 T1\$="CURRENT COLOR =":T2\$="PE N POSITION ":T3\$="MOVE PEN WITH RIGHT JOYSTICK" 100 CLS: 'MAIN MENU 105 H=JOYSTK(0)*7.62:V=-JOYSTK(1) *7.62 110 GOSUB 350 120 PRINT#-2, "C"C 130 PRINT@5, "480 X 480 COORDINAT ES" 140 PRINT@ 32, T1\$; C\$ 160 PRINT@128, T3\$

170 PRINT@192, "SELECTIONS" 180 PRINT@224, "<D>RAW LINE" 190 PRINT@256, "<C>IRCLE" 200 PRINT@288, "DX" 210 PRINT@320, "<P>RINT TEXT 220 PRINT@352, "<N>EW COLOR" 230 PRINT@384, "<Q>UIT" 235 PRINT@416, "SELECTION PLEASE: 240 K\$=INKEY\$ 250 IF K#="D" THEN 400 260 IF K\$="C" THEN 600 270 IF K\$="B" THEN 800 280 IF K\$="P" THEN 1000 290 IF K\$="N" THEN 1200 300 IF K\$="Q" THEN PRINT#-2, "A" :CLS:END 305 H=JDYSTK(0)*7.61:V=-JDYSTK(1)*7.61 310 PRINT@64, T2\$; "X="; INT(H); "Y= "; INT(-V) 320 PRINT#-2, "M"H", "V 330 GOTO 240 350 IF C=0 THEN C\$="BLACK" 360 IF C=1 THEN C\$="BLUE" 370 IF C=2 THEN C\$="GREEN" 380 IF C=3 THEN C\$="RED"

410 H=JOYSTK(0)*7.61:V=-JOYSTK(1

) *7.61 420 PRINT@O, "DRAW SUBROUTINE" 430 PRINT@128, T3\$ 450 PRINT@192, "<X> TO EXIT 460 PRINT@32, T1\$; C\$ 470 PRINT@64, T2\$; "X="; INT(H); "Y= "INT (-V) 480 K\$=INKEY\$ 490 IF K\$="X" THEN 100 500 IF K#="N" THEN 1200 510 PRINT#-2, "D"H", "V 520 GOT0410 600 CLS 610 PRINT@O, "CIRCLE SUBROUTINE" 620 PRINT@32, T1\$; C\$ 630 PRINT@64, T2\$; "X="; INT(H); "Y= "INT (-V) 640 PRINT@128, "INPUT RADIUS (1-2 40) ";:INPUT R 650 IF R>5 THEN PRINT@160, "CIRCL ES ARE SLOW BUT WORTH IT" 660 PRINT#-2, "M"H", "V+R 670 FOR Y=V+R TO V-R STEP -1 680 X=H+SQR(R*R-(Y-V)*(Y-V)) 690 PRINT#-2,"D"X","Y 700 NEXTY 710 FOR Y=V-R TO V+R 720 X=H-SQR(R*R-(Y-V)*(Y-V)) 730 PRINT#-2, "D"X", "Y 740 NEXTY



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810 PRINT@O, "BOX SUBROUTINE" 820 PRINT@32, T1\$; C\$ 830 H=INT(JOYSTK(0)*7.61):V=-INT (JOYSTK(1)*7.61) 840 PRINT@64, T2\$; "X="; H; "Y="; -V 850 IF D=O THEN PRINT@128. "POSIT ION PEN TO FIRST CORNER ANDPRESS 860 IF D=1 THEN PRINT@128, "POSIT ION PEN TO DIAGONAL CORNER AND P RESS <Z>" 870 PRINT#-2."M"H"."V 880 B\$=INKEY\$ 890 IF B\$="Z" THEN 940 900 IF B\$="A" THEN 910 ELSE 830 910 X1=H:Y1=V:B\$="":D=1 920 PRINT#-2, "J1.0" 930 GOTO 830 940 X2=H:Y2=V:D=0 950 GOTO 970 960 PRINT#-2, "M"X1", Y1" 970 PRINT#-2, "D"X2", "Y1", "X1", "Y 1", "X1", "Y2", "X2", "Y2 975 PRINT#-2, "M"H", "V 980 GOTO100 1000 CLS: PRINT@O, "PRINT SUBROUT INE": T\$="" 1010 PRINT@32, T2\$; C\$

750 GOTO 100

800 CLS: D=0: B\$=""

1020 PRINT@64, T2\$; "X="; INT(H);" Y=": INT (-V) 1040 PRINT@96." " 1050 INPUT"SELECT CHARACTER SIZE (0-63)";5 1060 PRINT@160, "ORIENTATION: " 1070 PRINT@192, "O= NORMAL = RIGHTSIDE" 1080 PRINT@224, "2= UPSIDE DOWN 3 =LEFTSIDE" 1090 INPUT Q 1095 PRINT@288, "ENTER TEXT DESIR 1100 INPUT T\$ 1110 PRINT#-2, "S"S 1120 PRINT#-2, "Q"Q 1130 T\$="P"+T\$ 1140 PRINT#-2,T\$ 1150 GOTO 100 1200 CLS: 1210 PRINT@O, "COLOR CHANGE" 1220 PRINT@32, T1\$; C\$ 1230 PRINT@96, "0=BLACK 1=BLUE 1240 PRINT@128, "2=GREEN 3=RED 1250 PRINT@192, "COLOR DESIRED 1260 INPUT C 1270 GOTO 100

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VISIBLE CHECK REGISTER

By Sid Brooks

risible Check Register will provide you with a monthly record of your checking account and a summary by account number and dollar amount of where your money is being spent. All of this is easily saved and retrieved on tape.

This is my first computer program and I hope you enjoy running and modifying it as much as I have. It started out as the checkbook program on Page 227 of the manual.

After running that program as listed, I was disappointed to learn that the neat little table shown in the book never actually appeared on screen but was simply a table of the information being processed. The first step was to develop a display that looked as much as possible like my check book register, then, account totalizing, which is a very nice way to see where the family money is going.

When CoCo was turned off, all of the input was lost, so, the next development was input and output to tape. You can imagine, I'm sure, typing in 20 or 30 entries to see if the display scrolls properly only to realize that the [BREAK] button would again have to be pressed and another brainstorm would have to manifest itself to correct this or that. By this time, there were enough facets to the program to warrant a menu. Then came the edit feature and finally the jumping cursor. (No small feat). The listing represents 61 major modifications and approximately five months of learning.

I plan to add a bar graph to represent the account totals as they relate to a budget. This could be entered from tape as are the account names. Finally, output to a printer, and then it will be possible to do the accounting of a family or even a small business in a very professional manner with monthly statements and all.

If anyone would like a copy of this program on tape, please send \$4 and a blank 30 minute cassette and I'll CSAVE it five times and check it to be sure each loads properly and then mail it right back to you.

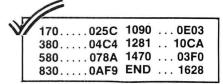
To run the program, CLOAD"CHECKS" and follow this

- 1. Type RUN.
- 2. Type Y or N for prior month review.

A. If Y: load tape to be reviewed. Press play button on

(Sid Brooks is a 1961 graduate of Miami, Florida's Coral Gables High School. He operates a computerized supply room for Louis Rich Foods in Newberry, SC by using IBM terminals hooked to a mainframe with Oscar-Mayer in Madison, WI.)

- the recorder and [ENTER]. Previous listed accounts and entries will be available for all program functions.
- B. If N: You will be informed that 50 accounts are available and that you may use up to 14 spaces in
- 3. Type number of accounts required and [ENTER].
- 4. Type name of account and [ENTER]. Continue until all accounts requested have been named.
- 5. The MENU should now appear.
- 6. Press [ENTER] and type the date of 1st entry using four digits. Example: 1131 for Nov. 31. Then, [ENTER].
- 7. Type three-digit number. Press [ENTER]. This number must be 111 to 999.
- 8. If this is first entry for the period, it should be entered as a deposit. Type D.
- 9. Type amount of the beginning balance using the decimal point in the normal fashion. Press [ENTER].
- 10. Entry will appear on the screen very similar to the way it appears in a check register.
- 11. Editing.
 - A. If all looks correct press [ENTER] two times and continue.
 - B. If a mistake has been made, press [DOWN] ARROW] to activate the editing feature. The cursor will move to just below the last entry. Press the [UP ARROW] to position the cursor on the line needing correction. Now press [ENTER] two times and make the corrected entry. Press the [UP] and [DOWN ARROWS] to scroll. Press the [DOWN ARROW] until the cursor returns to the space just after the word POSITION at bottom of screen.
- 12. Press [ENTER] one time to return to the MENU.
- 13. It will save time to do the following:
 - A. After typing names of accounts, insert a blank tape and press record and play buttons on the recorder and press 4.
 - B. Label this tape for the family or business that it pertains to. Subsequent periods will not require typing in all the accounts if this tape is loaded in the same manner as a prior month review.



The listing:

10 CLS:PRINT@(200), "CHECK REGIST

ER S.G. BROOKS 370 CLS(1) NEWBERRY S 380 SET(8,0,1):SET(9,0,1):SET(8, C" 1,1):SET(9,1,1) 390 PRINT@(0), N\$ 20 FORJ=1T01000: NEXTJ: J=0: CLS 30 DIMF\$(39):DIMA(6,50) 400 S=1:GOTO420 40 DIMB(30): DIMC(30) 410 5=8+1 50 NS="DATE NUM # DEP 420 IF W>9 THEN WW=WW-1 CHECK 430 IF W>9 THEN SS=W-WW 440 IF W<10 THEN SS=S 60 PRINT@(196), "PRIOR MONTH REVI 450 IF A(1,88)>0 THEN PRINT@(0+(EW (Y/N)" 70 I\$=INKEY\$ S*32)), USING"#####; A(1,55); 80 IFI = "Y"THEN 1650ELSE 90 460 IF A(2, SS)>0 THEN PRINT@(4+(90 IFI = "N"THEN 100 ELSE 70 S*32)), USING"#####"; A(2, SS); 100 PRINT@(194), "YOU MAY USE UP 470 IF A(3,SS)>0 THEN PRINT @(9+ EACH TO NAME UP (S*32)), USING"##"; A(3, SS); TO 14 SPACES TO 50 ACCTS":FORJ=1TO2000:NEXTJ 480 IF A(3, S8)=0 THEN PRINT@(9+(S*32)) " :J=0:CL8 110 CLS:PRINT@(196), "HOW MANY AC 490 IF A(4,SS)>0 THEN PRINT @(11 COUNTS DO YOU REQUIRE FOR +(S*32)), USING"####.##"; A(4, SS); THIS LISTING": INPUT" 500 IF A(4,SS)=0 THEN PRINT@(11+ (9*32))," " 5 B 510 IF A(4,SS)>0 THEN A(6,SS)=A(120 IFB>99 THEN 110 6, (SS-1))+A(4,SS) ELSE 520 130 H=1 520 IF A(5,88)>0 THEN PRINT@(17+ 140 CLS:GOT01420 150 CLS: W=W+1 (8+32)), USING"####.##"; A(5,88); 530 IF A(5,88)=0 THEN PRINT@(18+ 160 IF B<1 THEN B=1 (9*32))," 170 PRINT@ (198), "DATE OF TRANS ACTION": PRINT: INPUT" 540 IF A(5,SS)>0 THEN A(6,SS)=A(";A(1,W) 6, (88-1))-A(5,88) ELSE 550 180 IF A(1,W)<101 OR A(1,W)>1231 550 IF A(6,98)<>0 THEN PRINT@(24 **THEN 170** +(S*32)),USING"######## ##";A(6,SS) 190 CLS 200 PRINT @(195), "NUMBER OF DEPO 555 IF A(6, (W+1))=A(6, W) THEN 57 SIT OR CHECK":PRINT:INPUT" 0 ELSE 560 560 IF 8>8 THEN 570 ELSE 410 ";A(2,W) 210 IF A(2,W)<111 OR A(2,W)>999 570 PRINT@(0), N\$ 580 WW=0:98=0 **THEN 200** 590 PRINT@(425), "POSITION 220 CLS 230 PRINT@(197), "TYPE (D) FOR DE THEN PRESS (ENTER)" TYPE (C) FOR CH 595 IF A(6, (W+1))=0 THEN 610 ELS POSIT ECK E 600 600 IF TT=0 THEN 610 ELSE 680 240 IF A(4, W)>0 THEN 320 ELSE 25 610 FOR X=2 TO 8 250 IF A(5, W)>0 THEN 870 ELSE 26 620 SET(44, 26, X):SET(45, 26, X):SE T(44,27,X):SET(45,27,X) 260 Y\$= INKEY\$ 630 CCC#=INKEY# 270 IF Y\$<>"D" THEN 280 ELSE 320 640 IF CCCs=CHR\$(94) THEN 600 EL 280 IF Y\$<>"C" THEN 230 ELSE 870 SE 450 650 IF CCC\$=CHR\$(13) THEN 1280 E 290 CLS LSE 660 300 GOT0150 660 IF CCC#=CHR#(10) THEN 680 EL 310 END 320 CLS:PRINT @(198), "AMOUNT OF SE 670 DEPOSIT": PRINT: INPUT" 670 NEXT X: GOTO610 680 PRINT@(434)," "; A(4, W): SOUND225, 2: CLS: IF A(4 ,W)<1 OR A(4,W)>9999.99 THEN 320 690 IF W>8 THEN X=20 ELSE X=(W*2 330 A(6, W) = A(6, (W-1)) + A(4, W)700 IF CC\$<>CHR\$(94) THEN 710 EL 340 IF W>9 THEN WW=9 350 IF W<10 THEN M=W ELSE M=9 SE X=2

360 IF CC\$=CHR\$(94) THEN 380 ELS

E 370

720 SET(8, X, DD):SET(9, X, DD):SET(

710 FOR DD=2 TO 8

8. (X+1), DD):SET(9, (X+1), DD) 730 CC\$=INKEY\$ 740 IF CC = CHR + (94) AND X>1 THEN 750 ELSE 790 750 IF X>2 THEN 760 ELSE 770 760 SET(8, X, 1):SET(9, X, 1):SET(8, (X+1), 1):SET(9, (X+1), 1):X=X-2770 W=W-1:TT=TT+1:IF X<2 THEN X= 2 780 IF X=2 THEN 340 ELSE 790 790 IF CC\$=CHR\$(10) AND X<21 THE N 800 ELSE 840 800 IF X<21 THEN 810 ELSE 820 810 SET(8, X, 1):SET(9, X, 1):SET(8, (X+1), 1): SET(9, (X+1), 1): X=X+2820 W=W+1:TT=TT-1:IF X>20 THEN X =20 830 IF W>TT THEN PRINT@(32), N\$:P RINT@(384), "":PRINT:PRINT:PRINT: PRINT@(425), "POSSITION

THEN PRESS <ENTER>":S=
9:GOTO410
840 IF CC\$=CHR\$(13) THEN 860 ELS
E 850
850 NEXT DD:GOTO710
860 GOTO1280
870 CLS:PRINT@(198), "ACCOUNT NUM
BER":INPUT" ";A(3,W):CLS

Color Graphic Printer Package \$18

A set of three useful programs for the CGP-115.

BAR GRAPH — Good looking, accurate graphs with automatic height adjustment.

PIE GRAPH — Any number of slices, units adjusted, easy labeling, screen or printer.

COMMAND PROCESSOR — Lets you input, edit, list, and execute a list of CGP commands — A necessity for CGP owners. It was used to design this ad.

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A program for the DM of a D&D FRPG. Rolls characters, lets you draw maps, rolls dice, generates names, keeps 12 maps/characters or text screens in memory, saves anything to tape.

GAME PACKAGE 2 \$16

A collection of fourteen original BASIC games. Titles include: Mastermind, Allen Defense, Spike, and MX Missile Peace Keeper Game.



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- Low noise and no television interference.
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880 IF A(3,W)>B THEN 870 890 IF A(3,W)<1 OR A(3,W)>99 THE N 870 900 CLS 910 PRINT @(198), "AMOUNT OF CHEC K": INPUT" ";A(5,W) :CLS 920 SOUND225,2 930 IF A(5,W)<1 OR A(5, W)>9999. 99 THEN 910 940 A(6,W)=A(6,(W-1))-A(5,W) 950 GOTO 340 960 CLS:SOUND225,2:IF A(6,W)<0 T HEN CLS4 : SOUND 100,10 970 CLS 980 P=0:T=0:R=0:D=0 990 PRINT @(2), "A(1,1)"THRU"A(1 "PERIOD . W) s 1000 PRINT@(34), "A(2,1)"THRU"A("CHECKS 2.W) 8 1010 FOR Q=1TOW'REM TOTALS DEP 1020 P=P+A(4.Q) 1030 NEXT Q 1040 PRINT @(66). "TOTAL DEPOSITS 1050 IF P<1000.00 THEN PRINT @(8 8) USING"###### P ELSE PRINT @ (87) "USING"##### ##" # P 1060 FOR Q=1TOW 1070 T=T+A(5.Q) 1080 NEXT Q 1090 PRINT@(98). "TOTAL CHECKS 1100 IF T<1000.00 THEN PRINT @(1 20), USING"####.##";T ELSE PRINT @(119),USING"###### ##";T 1110 FOR N=1TOB:R=0:Q=0

1120 FOR Q=1TOW

1130 IF A(3,Q)=N THEN R=R+A(5,Q)

1140 NEXT Q

1150 IF R>O THEN D=D+1

1160 IF D>7 THEN 1170 ELSE 1200

1170 IF D=8 THEN PRINT@(418), "TO CONTINUE PRESS <ENTER>"

1180 BB\$=INKEY\$: IF BB\$=CHR\$(13)

THEN 1190 ELSE 1180

1190 D=1

1200 IF R>O THEN PRINT @(98+(D*3

2)),USING"##";N

1210 IF R>O THEN PRINT @(101+(D* 32)),F\$(N)

1220 IF R>O THEN PRINT @(116+(D* 32)), "="

1230 IF R>O THEN PRINT @(119+(D* 32)), USING"#####.##";R

1240 NEXT N

1250 PRINT:PRINT:PRINT:PRI

STANDS

TS-1 \$29.50	Monitor stand for 13" TV. 15W x 11D x 4H with cut-out for
φ29.50	13 W X 11 D X 4 H WITH Cut-out for
	ROM pack and ventilation holes.

PS-1 To elevate TV where computer \$19.95 does not slide underneath. 5W x 11D x 2½H with no cut-out. Can also be used as a Epson printer stand. (not pictured)

TS-5
TV stand for disk drive and color computer enclosure.
24W x 11D x 5H with cut-out for ROM pack.

TS-4 TV stand for 19" TV. \$39.50 24W x 11D x 4H with cut-out for ROM pack and ventilation holes.

MH-1 Magazine holder with semi tubu-\$25.00 lar riveted clip for large magazines. Reverse side has lip for single sheet. 9 x 12 face.

PS-3 Printer stand for DMP-200. \$28.75 16W x 15D x 2½H (not pictured)

PS-4 Same as above except with 1" \$32.25 wide slot in middle for bottom feed printers.

All stands available in smoked gray, ivory, or clear.

SYSTEM PACKAGE DISCOUNT

Deduct 10% for any 3 products that comprise a system.

WARRANTY

All stands warranteed for 1 year Amdek Monitors for 2 years Disk for 90 days

Zenith 131 for 90 days 123 for 1 year

J&M 90 days

GUARANTEE

Any product may be returned within 30 days for refund if not satisfied.







TS-1 & 300A



TS-5, C-1 & DD-3

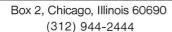


TS-4



MH-1

Howard Medical Company





MONITORS

300A 12" amber screen. High resolution 18MHz bandwidth. Extra speaker needed for sound. (Amdek)

123 12" green screen. High re-\$123 solution 15MHz bandwidth. Extra speaker needed for sound. (Zenith not pictured)

C-1 13" screen, color display. \$354 Medium resolution 4MHz bandwidth. Speaker included. (Amdek)

131 13" screen, color display. \$379 Medium resolution 2.5MHz bandwidth. Green screen switch, speaker included. (Zenith not pictured)

All monitors need video interface below.

DISKS

DD-3

Dual 3" disk drives. 40

track double density 368K
bytes on-line. Can be used
as stand alone system or
with other drives. Built-in
fan. Can record on both
sides of diskette. Drive
light changes color to
indicate side. Amdek.

CONTROLLERS

VC-1 Video interface mounts \$24.45 inside color computer by lifting IC and piggy backing it on top of interface. No soldering and no traces to cut. Gives video on one cable/sound on second cable.

DC-1
ROM disk controller plugs
into ROM slot. Can mix 35
& 40 track disks up to 3
drives. Gives 184K/side or
368K bytes on-line when
used with DD-3. Compatible with disk BASIC FLEX
& OS-9. Comes with
complete manual (J&M).

CA-1 Cable to connect disk to controller. Call or describe your configuration for correct cable.

NT 1260 PRINT@(418), "TO CONTINUE PR ESS <ENTER>" 1270 Ls=INKEYs: IF Ls=CHR\$(13) TH EN 1280 ELSE 1260 1280 CLS:PRINT@(143), "MENU" 1281 PRINT@(194), "CHECKS/DEPOSIT S PRESS (ENTER) PRINT REGISTER PRESS <1> ADD ACCOUNTS PRESS (2) LIST ACCOUNTS PRESS <3> SAVE ON TAPE <4>" PRESS 1290 Z\$=INKEY\$ 1300 IF Z\$<>CHR\$(52) THEN 1310 E LSE 1460 1310 IF Z\$<>CHR\$(51) THEN 1320 E LSE 970 1320 IF Z\$<>CHR\$(13) THEN 1330 E LSE 290 1330 IF Z\$<>CHR\$(49) THEN 1340 E LSE 340 1340 IF Z\$<>CHR\$(50) THEN 1290 E LSE 1350 1350 E=0:CLS:Y=99-B:PRINT @(198) "YOU HAVE" (Y) "ACCOUNTS. HOW MANY ARE REQUIRED": PRINT: INPUT" " &E 1360 IF B+E>99 THEN 1370 ELSE 13 90 1370 CLS:PRINT:PRINT:PRINT @(68)

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"YOU AND I BOTH KNOW THAT YOU DON'T NEED ANY WHERE NEAR THAT MANY ACCOUNTS. COME BACK TO REALITY AND SELECT" (Y) "ACCOUNTS OR L E85" 1380 INPUT" ":E: IF B +E>99 THEN 1370 ELSE 1390 1390 IF B+E>99 THEN 1370 1400 CLS: H=B+1 1410 GOSUB 1420: W=W+1: GOTO170 1420 FOR C=H TO (B+E) 1430 PRINT @(193), "TYPE NAME OF ACCOUNT NUMBER" (C:PRINT: INPUT" " : F\$ (C) 1440 CLS 1450 NEXT C:CLS:B=(B+E):GOTO1280 1460 PRINT@(389), "PRESS PLAY AND RECORD **<ENTER>** 1470 EE\$=INKEY\$: IF EE\$=CHR\$(13) THEN 1480 ELSE 1470 1480 CLS: G=W 1490 OPEN "O", #-1, "CHECKS" 1500 PRINT #-1.G 1510 PRINT #-1, H, B, E 1520 FOR S=1 TO 6 1530 FOR V=1 TO 6 1540 PRINT#-1, A(V,S) 1550 NEXT V 1560 NEXT S 1570 FOR C=H TO (B+E) 1580 PRINT #-1.F\$(C) 1590 NEXT C 1600 CLDSE #-1 1610 GOTO 1280 1620 NEXT S 1630 CLOSE#-1 1640 GOTO1280 1650 CLS:PRINT@(192)," TO REVIE W PRIOR MONTH REWIND TAPE DEP RESS PLAY BUTTON AND **<ENTER>"** 1660 ZZ\$=INKEY\$:IF ZZ\$=CHR\$(13) THEN 1670 ELSE 1660 1670 OPEN "I", #-1, "CHECKS" 1680 INPUT #-1.6 1690 INPUT #-1, H, B, E 1700 FOR S=1 TO G 1710 FOR V=1 TO 6 1720 INPUT #-1, A(V,S) 1730 IF EGF(-1) THEN 1800 1740 NEXT V 1750 NEXT S 1760 FOR C=H TO (B+E) 1770 INPUT #-1.F*(C) 1780 NEXT C

1790 IF EOF(-1) THEN 1800

1800 CLOSE #-1:W=W+G:GDT0340



NEW GOOD STUFF!

Turn your Color Computer into a graphic design center with the ease of a keystroke! MagiGraph makes it simple to create highly detailed figures up to and including an entire high-resolution screen. Designed for those with some experience in Basic and Assembly Language programming, MagiGraph includes lots of special features:

- A full set of logical and pixel manipulation functions simplifies the development of complex figures.
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 Toggle between the "macro" and "micro" screens for perspective on your creations.
- Nine animation buffers allow you to preview each sequence to ensure continuity and smooth flow.
- Versatile I/O routines store a graphic screen on cassette or floppy disk; recall it later for use by another program or revise it with MagiGraph.

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If you're looking for the finest graphic development utility available for your Color Computer, THIS IS IT. Maximize your machine's potential, while you push your imagination to the limit — with MagiGraph!

By Kevin Dooley. Cassette \$34.95 (16K required); Disk \$39.95 (32 Extended Color BASIC required); Amdisk cartridge \$44.95.

SAVE TIME! STOP WAITING AROUND FOR THE PRINTER!

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64K MEMORY UPGRADE KIT: For Rev. levels E, ET, NC, and TDP-100s. Eight prime 64K RAM chips, instructions, and CSPOOL: \$64.95

SYSTEMS SOFTWARE

MACRO-80C: DISK-BASED EDITOR, ASSEMBLER AND MONITOR—With all the features the serious programmer wants, this package includes a powerful 2-pass macro assembler with conditional assembly, local labels, include files and cross referenced symbol tables. MACRO-80C supports the complete Motorola 6809 instruction set in standard source format. Incorporating all the features of our Rompack-based assembler (SDS-80C), MACRO-80C contains many more useful instructions and pseudo-ops which aid the programmer and add power and flexibility. The screen-oriented editor is designed for efficient and easy editing of assembly language programs. MACRO-80C allows global changes and moving/ copying blocks of text. You can edit lines of assembly source which exceed 32 characters. DCBUG is a machine language monitor which allows examining and altering of memory, setting break points, etc.

Editor, assembler and monitor—along with sample programs—come on one Radio Shack compatible disk. Extensive documentation included. By Andy Phelps. \$99.95

SDS-80C: SOFTWARE DEVELOPMENT SYSTEM—Our famous editor, assembler and monitor in Rompack. Like MACRO-80C, it allows the user to write, assemble and debug assembly language programs with no reloading, object patching or other hassles. Supports full 6809 instruction set. Complete manual included. \$89.95

MICROTEXT: COMMUNICATIONS VIA YOUR MODEM! Now you can use your printer with your modem! Your computer can be an intelligent printing terminal. Talk to timeshare services or to other personal computers; print simultaneously through a second printer port; and re-display text stored in memory. Download text to Basic programs; dump to a cassette tape, or printer, or both. Microtext can be used with any printer or no printer at all. It features user-configurable duplex/parity for special applications, and can send any ASCII character. You'll find many uses for this general purpose module! ROMPACK includes additional serial port for printer. \$59.95

MICRO WORKS COLOR FORTH

- · Faster to program in than Basic
- · Easier to learn than Assembly Language
- · Executes in less time than Basic

The MICRO WORKS COLOR FORTH is a Rompack containing everything you need to run Forth on your Color Computer. COLOR FORTH consists of the standard Forth Interest Group (FIG) implementation of the language plus most of FORTH-79. It has a super screen editor with split screen display. Mass storage is on cassette. COLOR FORTH also contains a decompiler and other aids for learning the inner workings of this fascinating language. It will run on 4K, 16K, and 32K computers. And COLOR FORTH contains 10K of ROM, leaving your RAM for your programs! There are simple words to effectively use the Hi-Res Color Computer graphics, joysticks, and sound.

Includes a 112-page manual with a glossary of the system-specific words, a full standard FIG glossary and complete source listing.

MICRO WORKS COLOR FORTH ... THE BEST! From the leader in FORTH, Talbot Microsystems. \$109.95

MACHINE LANGUAGE

MONITOR TAPE: A cassette tape which allows you to directly access memory, I/O and registers with a formatted hex display. Great for machine language programming, debugging and learning. It can also send/receive RS232 at up to 9600 baud, including host system download/upload. 19 commands in all. Relocatable and reentrant. CBUG TAPE: \$29.95

MONITOR ROM: The same program as above, supplied in 2716 EPROM. This allows you to use the entire RAM space. And you don't need to reload the monitor each time you use it. The EPROM plugs into the Extended Basic ROM Socket or the Romless Pack I. CBUG ROM: \$39.95

SOURCE GENERATOR: This package is a disassembler which runs on the Color Computer and generates your own source listing of the BASIC interpreter ROM. Also included is a documentation package which gives useful ROM entry points, complete memory map, I/O hardware details and more. A 16K system is required for the use of this cassette. **80C Disassembler: \$49.95**

HARDWARE

PARALLEL PRINTER INTERFACE—Serial to parallel converter allows use of all standard parallel printers. PI80C plugs into the serial output port, leaving your Rompack slot free. You supply the printer cable. PI80C: \$59.95

SUPER-PRO KEYBOARD—\$69.95 (For computers manufactured after Oct. 1982, add \$4.95)

 ${\bf ROMLESS\ PACKS}$ for your custom EPROMS — call or write for information.

BOOKS

6809 ASSEMBLY LANGUAGE PROGRAMMING, by Lance Leventhal, \$16.95

TRS-80 COLOR COMPUTER GRAPHICS, by Don Inman, \$14.95

ASSEMBLY LANGUAGE GRAPHICS FOR THE TRS-80 COLOR COMPUTER, by Don Inman, \$14.95 STARTING FORTH, by L. Brodie, \$17.95

GAMES

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ADVENTURE—Black Sanctum and Calixto Island by Mark Data Products. Each cassette requires 16K. \$19.95 each.

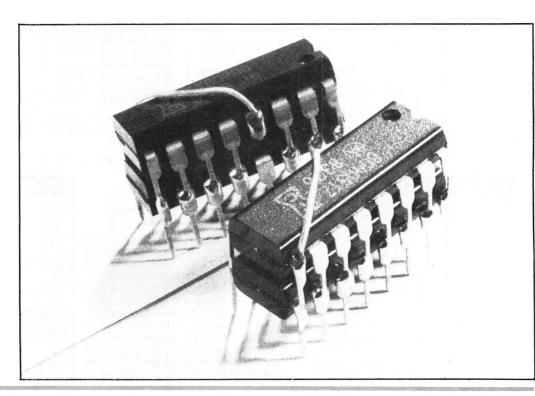
CAVE HUNTER—Experience vivid colors, bizarre sounds and eerie creatures as you wind your way through a cave maze in search of gold treasures. This exciting Hi-Res game by Mark Data Products requires 16K for cassette version. \$24.95

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UPGRADING YOUR NOR COMPUTER 2



By Tony DiStefano Rainbow Contributing Editor

long, long, long, long time ago Radio Shack introduced a little gem called the Color Computer. It had a whopping 4K RAM memory. The first thing you knew, the hobbyists were able to expand this computer's memory to 16K, probably even before Radio Shack introduced its 16K. Then the hobbyists boosted the memory to 32K by a method known as piggyback, again before Radio Shack. The hobbyists didn't stop there, 64K memory was next. But the 64K memory did not consist of piggybacking four sets of 16K chips, it was a different chip. All of the 32K piggyback chips were put on the shelf or put in computers whose owners did not care for 64K. Where am I leading with all this, you may ask? Well, a few months ago Radio Shack released another little gem, the Color Computer 2. Only this time they started with 16K memory and after looking inside one, I saw that it was very easy to upgrade to 64K. Most of the owners will be upgrading to 64K. This is part one of this month's article: How to upgrade from 16K to 64K memory in the Color Computer 2. To upgrade your Color Computer 2 to 64K, you must first get a Color Computer 2. Ha ha, only kidding, but you will need some 64K memory chips. The

(Tony DiStefano is well known as an early specialist in Color Computer hardware projects. He is one of the acknowledged experts on the "insides" of CoCo.)

chips to get are #4164, with an access time of 300ns or faster. There are many different suppliers for this chip, with many different numbers, but as long as they are 4164 compatible they will do.

Open the CC-2 by removing all of the screws on the bottom. Remove the top cover. Carefully remove the keyboard by pulling the ribbon wire out by the dark colored base. The eight identical chips along the bottom of the PCB are the old 16K chips. Using an IC extractor or a small flat screwdriver, remove the eight chips. Put them aside for now. Insert the 4164 chips. Make sure that pin one on the chip goes in pin one in the socket. The only other thing you have to do is to make one solder joint. Look for a small "W1" in between the 6822 PIA and the SN74LS244 chip. Right above this W1 mark are two solder points. Solder these two points together and voila, 64K memory. That's all there is to it! Now, if a whole lot of people convert to 64K, that will leave a lot of 16K chips sitting around doing nothing.

This will be the second part of this month's article. Those 16K chips that are removed from the Color Computer 2 to make 64K can be used to give you 32K. Yes, it will be in the piggyback fashion. It is a little harder to do than a 64K upgrade, but nevertheless can be done in less than one hour. To upgrade a 16K Color Computer 2 to 32K you will need either a set of 16K chips removed from another Color Computer 2 or buy a set of 16K chips. One important note to remember is these chips are not ordinary 16K chips. They are not the same chips that come from the regular Color Computer. The chips that come from the first CoCo are 4116 chips. The 16K chips that go into the Color Computer 2 are 2118 chips. The main difference between a 4116 and a 2118 chip is that the older type 4116 needs three power supplies to run. It needs +5 volts, +12 volts and -5 volts. The newer 2118 needs only +5 volts to run. It is also more power efficient.

If you piggyback 4116 chips in the CC-2, it will not work, and might even do some damage, so don't put 4116 memory chips in the CC-2. Now that the warning has been said, it's time to continue. Remove the eight memory chips from the board. You should now have 16 memory chips, eight from your computer and eight from another source. Put half of them aside for now. Examine one of the chips carefully, notice the pins. When a pin comes out of the chip it is wide, then it becomes narrow. The narrow part of the pin is the part that goes into the socket. With a narrow pair of longnose pliers (or a finger, if you have narrow fingers) grab the narrow part of pin 4. Bend the pin back and forth until it falls off. Be careful that you don't bend the wide part of the pin. That part of the pin should stay intact. Do this to seven more chips to give you a total of eight chips with the narrow part of pin 4 removed. Next take out the untouched chips. Mount the chips with the short pin on top of the chips with all the pins. The photo will help you determine how to position the chip. This photo was taken with a mirror, so that you can see both sides of the chip (there is only one chip in the photo). Before you start soldering, make sure that pin

1 on the top chip is on top of pin one on the bottom chip. Leave a small gap in between the top and bottom chip. This is needed for ventilation. Next, solder all the pins together. All but pin 4 of course, it is now to short to reach anyway. Okay, now get a small piece of wire. Any thin wire will do, I used some Radio Shack wirewrap wire. Cut eight pieces about ½" long. Strip off about 1/32" of insulation off each end of each wire. Solder one end of this wire to pin 4 (the one with the short leg) of the chip-pak and the other end to pin 9 (still on the top) on the chip. Do this to all eight chip-paks. After you are finished clean the chip-paks carefully with a resin remover. Radio Shack now carries resin remover. The part number is 64-2322. It is not of the best quality, but is good for small jobs like the chip-paks. After the chip-paks are clean, check them over for shorts or cold solder joints and repair them. When you are sure that they are all okay, plug the paks into main board. Again, make sure that pin one on the chip goes into pin one in the socket. When you are finished, turn the computer on and type in:

PRINT MEM [ENTER]

Without a disk drive plugged it, the amount of memory displayed should be 24871. With a drive plugged in, the value should be 22823. And finally without Extended BASIC it should be 31015. If you get these values, all is okay and you can close up your CC-2. That's all there is to do to upgrade a CC-2 from 16K to 32K. If you have problems, chances are that you soldered one of the chips in backwards. In that case you might as well throw the two chips away and start again. Well, that's all for this month.

I hope you have lots of good memories.



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Nostalgia, Notes And Tools Of The Trade

By Dale L. Puckett RAINBOW Contributing Editor

rew program or two under the Christmas tree—maybe you'll even get your first look at OS-9 that way—is bound to put you in the mood. Besides, as a CoCo owner you have every right to be nostalgic as you wind up 1983 and move into the new year. You now own one of the best operating systems on a microcomputer today.

I must confess, I got a head start on you. Just when I was preparing to write this month's column,—it's October 30—Richard Don, the infamous vice president at GIMIX, called. He was excited because several large companies had just bought one of his GIMIX III systems with one million bytes

of RAM memory and 47 million bytes of online storage on a hard disk. Neither one of us could believe it. Little more than five years ago we had both started in this business with micros that had barely 4,000 bytes of RAM memory and no online storage. The sea stories started.

It reminded me of the first six months I owned my SWTPC computer. I didn't have a teletype machine with a paper tape reader and cassette tape storage hadn't been invented for micros yet, so I left the computer turned on for several weeks at a time. After all, it took three or four hours to type in two or three thousand bytes of hex object code by hand—just to play tic-tac-toe. There's nothing that can

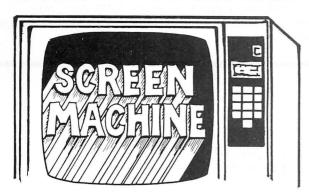
```
PROCEDURE Boldface
 0000
            DIM in: STRING[50]
 00001
            DIM char: STRING[1]
 ØØØD
 0019
 ØØ1A
            PRINT "Type string you would like to see boldface? ";
            in="" \a=Ø
 ØØ4B
 ØØ5A
 ØØ5B
            WHILE char<>CHR$(13) DO
 0068
              GET #Ø, char
 0071
              in=in+char \a=a+1
 00339
            ENDWHILE
 MASD
 ØØ8E
            PRINT
 aaaa
            PRINT CHR$($1B)+CHR$($51)
            PRINT "This is the boldface string ";
 ØØ9B
            PRINT in;
 ØØBC
 ØØC2
            FOR i=1 TO a \setminus PRINT CHR$(8);
            PRINT CHR$($1B)+CHR$($49); in;
 ØØE5
 ØØF5
            PRINT ", did you like it?"
 Ø1ØB
            PRINT
 Ø1.0D
            PRINT CHR$($1B)+CHR$($71)
 0118
            END
 Ø11A
```

(Dale L. Puckett is a freelance writer and programmer who has worked with the Motorola family of miroprocessors since 1976. He just completed his first book, "A Complete Tour Guide to BAISC09," this summer. It is being published by Microware and will be available

this fall. He is the author of DynaSpell, Readtest, Esther and Help, which are available from Frank Hogg Laboratories. He serves on the Info World Software Review Board and is a Chief Warrant Officer in the U.S. Coast Guard.)

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compare with being a pioneer.

Which brings me to some good news. Richard went out to the RAINBOWfest in Fort Worth to see what this CoCo OS-9 thing was all about. When he returned to Chicago, he was bursting with enthusiasm. In fact, he was so excited when I talked to him that he was thinking about offering a GIMIX III system as a grand prize for an OS-9 contest here at the Rainbow. That's a much better deal than those magazine sweepstakes.

Richard's excitement peaked when he ran into an old friend who now works for Tandy. In fact, it seems he was one of the people responsible for bringing OS-9 to the Color Computer. But more important, he is still working hard to produce or procure a tremendous selection of new and powerful software to run on it. As it turns out, Richard's

friend is also a pioneer and has been working with Motorola's 6800 chips as long as they have been manufactured.

In Richard's words, "He came up through the ranks..he's not a Z-80 retread. You couldn't find a more scrupulous person in this business. If a piece of software is good this guy will recognize it. Great things are going to happen to CoCo OS-9."

I asked him if he heard anything specific and got some great news. A CoCo OS-9 version of Microware's "C" compiler—one of the best on any microcomputer—is in production now. In fact, it will probably be on the shelf by the time you read this. Better yet, scuttlebutt has it that the price will be somewhere in the \$100 price range. Very impressive when you consider that it costs \$400 on the larger 6809 systems.

```
PROCEDURE Underline
 वलवन
 0001
            PRINT "This is an underlined word";
            PRINT CHR$ ($1B) + CHR$ ($51);
 0020
            FOR i=1 TO 15 \ PRINT CHR$(8);
 ØØ20
            PRINT "
                                       in a line."
 ØØ4F
            PRINT CHR$ ($1B) + CHR$ ($71);
 ØØ5E
 ØØ7A
            PRINT
 ØØ7C
            END
 ØØ7E
PROCEDURE RisingLine
 agag
 0001011
            DIM char: STRING[1]
 ØØØD
            DIM as:STRING[50]
 0019
 001A
            PRINT "Input string ? ";
 ØØ2E
            Q=5/ ""=#5
 ØØ3D
            WHILE char<>CHR$(13) DO
 ØØ3E
 ØØ4B
               GET #Ø, char
 0054
               a == a + char \ a = a + 1
 ØØ50
            ENDWHILE
 0070
 0071
            FOR i=1 TO INT(a/4)+1 \ PRINT
 0099
            FOR i=1 TO a
 ØØAB
               PRINT MIDs(as,i,1); CHRs($1B)+CHRs($4B);
 ØØC2
            FOR i=1 TO INT(a/4)+1 \ PRINT
 ØØCD
                                               \NEXT i
 ØØF5
            END
 WWF 7
PROCEDURE CharacterSets
 ØØØØ
 \emptyset\emptyset\emptyset1
            DIM as:STRING[80]
 ØØØD
            DIM cs:STRING[1]
 0019
            b事:=CHR事($1B)+CHR$($4A)
 ØØ1A
 0028
            c$:=CHR$($ØD)
 0031
 0032
            PRINT ba+"StdCS"
 ØØSF
            PRINT "This is an example of the standard character"
 ØØ5F
            PRINT "set. It is easy to change to ";
            PRINT bs+"Std64";
 0091
 009F
            PUT #1,c$
```

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OS-09 Users Group News

Here's an interesting note I pulled off our OS-9 Users Group Bulletin Board (312-397-8308—Type a Carriage Return and Line Feed, then answer the prompt with "HEL-G500,,3[ENTER]" to get on line.): "The activity on the CoCo SIG on CompuServe with respect to OS-9 is really picking up. There are many technical messages, queries, observations, and complaints by users with every level of sophistication. It won't be long until we see some neat things from that group."

From the tone of that note, you can see that Users Group members are anxiously awaiting an active participation from CoCo OS-9 Users. In fact we are talking about putting a CoCo Help menu on our Bulletin Board. We'll let you know here when it is on the air.

Frank Hogg has offered to distribute our Users Group software. This means our members will be able to get utilities and programs from our software exchange library for only \$3. In fact, each new member will receive one disk of software FREE when he/she joins the Users Group. The first disk should be available by December 1.

Our membership fee is \$25. For information about our group and a sample copy of our newsletter, send a note to us at our new address:

OS-9 Users Group Post Office Box 8027 Des Moines, IA 50301

The Toolbox Philosophy

Since OS-9 is modeled after the UNIX system, it's only fitting that we should learn to think of individual programs

and utilities as tools. We can run more than one process very easily with OS-9 and that's half the battle. Now, all we have to do is figure out how to use several of our small programs together to do a big job.

Let's begin with a few examples. When I first ran OS-9, I did everything the hard way. I typed out every pathlist. I just didn't trust the machine. I was as non-productive as you could be. One of my typical command lines might have looked like this:

OS-9:/d0/cmds/copy #16K /d0/cmds/greatbigprogram /d1/cmds/greatbigprogram

Talk about sore fingers!

Then, I learned about the default directories. Life was much simpler:

OS:9 chd /d0/cmds OS:9 copy #16K program /d1/cmds/program

That was much better. But then every once in awhile, I found myself needing to copy a directory that contained 30 or 40 files. I used the "Control A" key a lot. This saved about half the typing, but it was still a hassle.

About six months later a utility called "dsave" was introduced. It was very useful for copying an entire directory—or even an entire disk. The commands went something like this:

OS9: chd /d1/directorytocopy

OS9: dsave / da > / d0 / copy-procedure-file

OS9: chd /d0

OS9: /d0/copy-procedure-file

```
ØØA8
           PRINT "a different set. In"
           PRINT "this case we are running 64 by 19 set. It is also easy"
ØØBF
ØØF9
           PRINT "to have ";
           FRINT b$+"Dwcs";
0106
Ø113
           PUT #1,c$
           PRINT "a Double Width Char-"
Ø11C
           PRINT "acter set. However it
0134
Ø14E
           PRINT "is ";
0156
           PRINT b$+"StdCS";
Ø154
           PUT #1,c$
Ø16D
           PRINT "much easier to read the standard 51 by"
Ø197
           PRINT "24 Character set."
Ø1AC
           PRINT
Ø1AE
           END
Ø1 BØ
PROCEDURE Menu
gggg
ØØØ1
           SHELL "tmode -pause"
0011
0012
           DIM char: STRING[1]
ØØ1E
           DIM choice: INTEGER
0025
0026
           PRINT CHR$ ($ØC) \ PRINT
ØØZØ
0031
           PRINT "1.. Rising Line test."
                 "2.. Boldface test."
ØØ4A
           PRINT
ØØ6Ø
                 "3.. Underline test."
           PRINT
0077
                 "4.. Switch Character Sets."
0095
                 "5.. Exit."
           PRINT
ØØA2
           FRINT
```

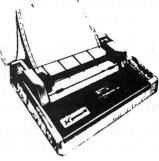
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When I ran this sequence the machine did most of the typing. Dsave generated a file with a series of lines that looked similar to the first example above. Since I always re-directed them into a file, I then needed to run this procedure file. It was really slick to watch the computer do all the work by itself.

Yet the process was still simpler when pipes became available a year or so later. How would you like to trade the four lines of typing above in for two command lines—and the first line doesn't really count! Write them on a label and stick it to your keyboard. It will save you hours.

OS-9: Chd /d1/directorytocopy

OS-9: dsave /da! (-x chd /d0/directory-to-copy-to)

When you try this, you'll be using your first OS-9 "pipe." The magic is in the exclamation point—the symbol for an OS-9 pipe. Here's what happens when you run the command lines above.

The first line sets your current data directory to /d1/directorytocopy. Dsave always saves the current data directory.

In the second line we used a pipe, "!", instead of redirection, ">/d0/copy-procedure."

Since we didn't use redirection, OS-9's Shell would normally have sent the output of dsave to the standard output device. Remember, this is normally your CoCo screen or terminal. But, since you typed the pipe symbol after the dsave command, the Shell will pipeline the data straight into the command on the second half of the line.

In this case, the second half of the line tells the Shell not to abort on an error and to change the current data directory to /d0/directory-to-copy-to. After it does this, the Shell accepts the characters from dsave just as if they were coming from

the keyboard. Each time the Shell finds a carriage return on the end of a line, it executes the commands on that line. When each of the lines generated by dsave has been executed, your new directory will be ready to run.

More About Pipes, Filters and Other Tools

Let's look at some more examples and introduce you to some new OS-9 tools. Microware released a package of utilities called "The OS-9 File Handler Tool Box" in August. I bought it while I was at the seminar and it seems that I am using it all the time.

Microware designed the package so that most of the utilities could be used as filters. In other words, they would read data from standard input device, modify it in some manner, and then send it to the standard output device. Additionally, several of the programs in the package can take a list of filenames from your keyboard and perform the desired operation on all of them.

The idea for this package came from the Addison-Wesley book *Software Tools* by Brian W. Kernighan and P. L Plaugher. All of them are popular on the UNIX operating system. The package includes:

Code	Display the nexadecimal equivalent of a key
Count	Character count, word count, line count
Compress	Compress a text file
D	Print directory listing
Expand	Expand a compressed file
Grep	Globally find Regular Expression and Print
PR	Print a file with formatting
QSORT	Quick in-memory sort
Space	Space and/or indent a file

```
ØØA4
ØØA5
          LOOP
            PRINT "
                           Your choice ";
ØØA7
ØØBE
             INPUT choice
          EXITIF choice=5 THEN GOTO 100
ØØC3
ØØD2
          ENDEXIT
            PRINT
ØØD6
            WHILE choice>Ø AND choice<6 DO
ØØD8
ØØEB
               IF choice=1 THEN RUN RisingLine
ØØEC
ØØFB
               ENDIF
               IF choice=2 THEN RUN Boldface
ØØFD
Ø1ØC
               ENDIF
               IF choice=3 THEN RUN Underline
Ø1ØE
               ENDIF
Ø11D
               IF choice=4 THEN RUN CharacterSets
Ø11F
Ø12E
               ENDIF
0130
               PRINT "Type 'ENTER' to continue ?";
0131
Ø15Ø
               GET #Ø, char
0159
Ø15A
             ENDWHILE
          ENDLOOP
Ø15E
0162
0163 100
          SHELL "tmode pause"
Ø175
           END
0177
```

Split TR Xmode Split a file into pieces Transliterate file contents

Examine or change device descriptor (This

one is standard with CoCo OS-9)

Now, let's show you how you can use several of these small utilities on the same command line to do a big job.

For example, when your directories get long—they really shouldn't with OS-9's hierarchical directory system—it is a hassle to look through a list of filenames in random order. Life would be much easier if you could look at a sorted list. Try this command line:

d! qsort! pr >/p

Amazing, isn't it? Now, imagine that you would like to know how many "C" source files you have in a directory. Let's count them:

OS9: d *.c! count -1

This command line should do the job if your "C" source files are in your current data directory.

Now imagine that you are an author and that you have just finished writing another chapter in the great American novel. You have full confidence in your abilities as a writer but you realize you have this bad habit: you keep using tacky words. Instead of writing "use," you write "utilize" by force of habit. This time, you remember the problem and want to make a quick check to make sure you didn't slip up. Try this:

OS9: grep utilize Great.American.Novel.Chapt4! count -1

In a few seconds you'll know how many times you used the word utilize. Slick, huh? By now you can see that with a full toolbox you can find out just about anything you want to know by using the proper OS-9 command line.

Here's some better news. There are a lot of good UNIX textbooks out, several UNIX journals and a number of articles in the trade press about this operating system. All of these books and articles give good examples that show you how to exercise the UNIX toolbox for all it's worth.

Harry Fair, a consultant out in Denver, has approached Frank Hogg Labs with a proposal to release an OS-9 toolbox that is UNIX compatible. All of the utilities will have UNIX names and their command line syntax will be just like the same utility on the UNIX system. I saw the proposal this month and it's a tremendous step in the right direction. In fact, I'm running the first 15 utilites in my OS-9 toolbox now and they are great.

SOME MORE BASIC OS-9 DEMOS

Last month we told you a lot about the Hi-Res screen in the O-PAK release from FHL. At that time we promised to show you more this month. The BASIC OS-9 utilities accompanying this article exercise several of the capabilities built into Hi-Res. You'll see how to underline a word, boldface a word, or make a line run uphill. These sample precedures will give you another chance to study the structured programming techniques made possible by BASIC OS-9.

As we close, I extend my best wishes to you and your families for the happiest of holiday seasons as well as an exciting and prosperous New Year.

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This is an 8" x 4" cartridge, that plugs into the expansion port of the CC. Z-Pak is capable of holding up to 80K of EPROM (must be factory installed). THAT'S RIGHT as new firmware options become available and are ordered they become part of random access memory like IC, ID & IE ** ALL ONLINE AT THE SAME TIME ** Now lets do a little addition, if you have 64K of RAM and X-BASIC, then Z-Pak gives you the potential of having a 160K system someday ... THAT'S APPROXIMATELY WHAT A DISK HOLDS!! Option #1 — Two parallel ports (additional \$19.95)

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Try This Helpful Number-Base Conversion Quiz

By Gary and Susan Davis

When my husband first bought his Color Computer almost three years ago, I was faced with the newest dilemma of our marriage: Should I try to learn to use the blankety-blank thing or should I become a computer widow instead?

Computer widowhood did not suit me at all, so I set up my plan of attack. I carefully went through the book "Getting Started with Color BASIC" and I enrolled in my first computer course at Ohio State University. So far, so good. The BASIC seemed like English and the introductory course at OSU was in FORTRAN.

The trouble started the next quarter when I enrolled in the next course at OSU. This time the language was COBOL and the assignments were much harder.

The fact that there were different computer languages was not a problem for me. I was a linguistics major in college and have varying degrees of knowledge of English, Spanish, French, Italian, Yiddish and Hebrew.

However, I found out that there are also different numbering systems involved in programming. This was bad news for someone who has for years resisted learning the metric system.

The teacher wanted us to take decimal numbers (the normal, regular, everyday numbers that you count with) and convert them to *hexadecimal* and *binary*!

Once I understood that the "1"s and "0"s of the binary system are treated like on or off switches by the computer, I felt more comfortable with it. Hex will always seem unnatural to me.

Gary wrote this program to help me learn to convert any decimal, hexadecimal or binary number to one of the other number bases. With practice, I was able to answer most of the questions correctly most of the time. Facility in all three number bases will help you program in both BASIC and machine language.

The computer will randomly pick a number between 0 and 255 (decimal) for you to convert. It will also choose one of the three number bases into which you will need to convert the original number. You get up to three chances to correctly answer (guess) the question. If you haven't the faintest idea what's going on, strike the question-mark key and [ENTER].

(Gary and Susan Davis are co-owners of Sugar Software in Reynoldsburg, Ohio. Susan is a novice and Gary has been professionally programming for nearly 20 years.)

There are 10 random problems in each quiz. When you are done, the computer will tell you how many you have answered correctly on the first try, how many you have answered correctly after a retry and how many were beyond you completely.

I hope you will find this number base quiz as helpful as I did.

,	140 0109
	300 0237
The listing.	480 03F5
The listing:	END05EB
	Base
20 '	
30 ' Convers	sion
40 '	
50 ' Qui 2	
60 '	
70 ' (C) 1982 By Sugar	Software
80 ' Written by Gary	
90 ' 2153 Leah L	
100 ' Reynoldsburg, Oh	io 43068
110 ' (614) 861-0	
120 '	
130 FOR I=1 TO 10	
140 CLS4	
150 PRINT TAB(8); "PROB	I FM NUMBER
";I:PRINT	
160 PRINT TAB(11); "WHA	T IS":P
RINT	
170 FROM=RND(3)	
180 TO=FROM+RND(2)	
190 IF TO>3 THEN TO=TO	_Z
200 NUMBER=RND (256) -1	/-3
	E00 E70
210 ON FROM GOSUB 470,	
220 ON TO GOSUB 570,61	0,650
230 FOR J=1 TO 3	
240 PRINT N1\$;" IN ";N	12\$
250 INPUT A\$	
260 IF AS=ANSWERS GOTO	
270 IF A\$="?" GOTO 310)
280 PRINT "wrong"	
290 SOUND 5,2	
300 NEXT J	

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660 GOSUB 710

670 ANSWERS=NS

680 RETURN

690 ' Convert BER"

700 'to binary and return

710 'string in N\$

720 N\$=""

730 N=NUMBER

740 FOR K=1 TO 8

750 BIT=N AND 1

760 N\$=RIGHT\$(STR\$(BIT),1)+N\$

770 N=INT(N/2)

780 NEXT K

790 RETURN



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Printer Mystery

By Michael J. Himowitz and Julius Nelson

This is the third installment in a continuing series of short 'Printer Mysteries' which began in November.

ere's a little January printer mystery for those of you who have the Printer Artist program from the November issue of the Rainbow. To use it, RUN the program and enter the characters below, line by line. For example, 6X means strike the "X" key six times; 24sp means strike the space bar 24 times. Consult the instructions in the November issue. We won't tell you what this one is, because that would spoil the fun. The only clue is that you're more likely to see this fellow in Minnesota than in Florida.

For those interested in sophisticated printer art development, a complete "Printer Artist" system is available from Federal Hill Software, 825 William St., Baltimore, Md., 21230.

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RAINBOW

```
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  30sp 5X 19sp 1X 2sp 1X 2sp 1X 2X 1x
5 17sp 2X 11sp 4X 18sp 2X 2sp 1X 2sp 1X 2sp 1X
6 16sp 3X 11sp 3X 17sp 7X 1sp 1X 2sp 1X
7 15sp 5X 10sp 3X 14sp 11X 1sp 2X
8 13sp 7X 4sp 2X 4sp 2X 12sp 15X
9 11sp 10X 3sp 3X 3sp 3X 7sp 15X
10 9sp 13X 1sp 27X
11 8sp 24X 5sp 8X
12 7sp 24X
13 8sp 23X
14 8sp 21X
15 9sp 18X
16 13sp 20X
17 14sp 3X 2sp 17X
18 19sp 19X
19 19sp 19X
20 19sp 19X
21 17sp 22X
```

23 15sp 9X 1sp 17X 24 14sp 8X 4sp 16X 25 13sp 5X 9sp 16X 26 12sp 5X 6sp 21X 27 11sp 5X 4sp 27X

22 16sp 25X

28 10sp 5X 4sp 31X 29 10sp 4X 4sp 15X 3sp 16X 30 10sp 3X 5sp 11X 8sp 17X

31 18sp 8X 18sp 14X

32 18sp 8X 18sp 14X

33 17sp 8X 22sp 11X 34 16sp 9X 24sp 11X

35 16sp 9X 28sp 9X 3sp 2X

36 17sp 7X 29sp 13X

37 17sp 6X 31sp 5X 3sp 2X 38 16sp 7X 30sp 9X

39 14sp 8X 32sp 2X 2sp 2X

40 12sp 11X 31sp 1X 1sp 2X

41 8sp 1X 1sp 2X 4sp 1X 5sp 1X 31sp 2X 42 9sp 5X 2sp 1X 6sp 3X 26sp 3X

43 9sp 18X

44 12X 2sp 15X 2sp 15X 2sp 14X 2sp 11X

(Mike Himowitz is a Washington correspondent for the Baltimore Evening Sun and proprietor of Federal Hill Software. Julius Nelson is an educator, author of many typing textbooks and creator of the craft known as "Artyping.")

Setting

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COMMUNICATIONS

CSAVE YOUR PROGRAMS WITH CONFIDENCE

By Jorge Mir

ow many times have you saved a program on cassette and encountered an "I/O ERROR" when you tried to load it back in? If you don't make more than one copy, well, you know very well what it means.

You can now save programs to cassette with a lot more confidence. This is what *Protect* was mainly designed to do!

Protect is a short BASIC subroutine to be added to programs you are developing (or to any program for that matter) in order to protect them from being "erased." I placed the word erased in quotes because your computer does not really erase any BASIC program, it just changes the pointers telling the computer where the program starts and ends and where the first step is.

Append the *Protect* subroutine at the end of your program. Have the first step in your program indicate a "GOSUB 9000" statement to the subroutine and from then on you will have the program protected.

IMPORTANT: Any time you add, delete or edit steps to your program, RUN it again to make sure the Protect

(Jorge Mir is a certified public accountant and is currently controller of a "Fortune 500" company. He publishes most of his original work on the CoCo through the Rainbow.)

subroutine keeps track of the new BASIC pointers.

The *Protect* subroutine actually creates a short machine language program which, when executed, will reset the BASIC pointers so you can get back into the program. For example, you can actually type NEW [ENTER] which wipes out your program without losing it at all! All you have to do is type EXEC[ENTER] and presto you are back into your program.

There is a *CSAVE* subroutine within *Protect* which will allow you to save programs to cassette and immediately reload them to make sure they were correctly copied. When you are ready to make a cassette copy of your program, just type GOTO 10000. The program will then ask for the filename under which your program will be saved. It will save it to cassette and will then ask you to reload it immediately to check it out.

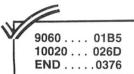
If you encounter an I/O Error when loading the copy, don't worry. All you have to do is type EXEC[ENTER] and you are back into the original program which you can try to save again. It is just that simple!

If for some reason the BASIC pointers are accidentally changed by either typing NEW or *POKEing* erroneously into the pointer locations in RAM, just follow the same procedure to recover the program.

In some cases, you may not be able to follow this procedure to make sure your program has been copied correctly. For example, if your program is quite long, you might run out of memory when you are reloading the copy. What actually happens is that both programs (the original one plus the reloaded copy) must reside in memory. If both of them cannot fit in memory, you will get an O/M Error. If that is the case, there is only one thing to do: Make several copies to make sure you get a good one!

Protect will give you that added peace of mind against

those monstrous words: "I/O Error."



GOSUB9000 ****** 2 3 TYPE YOUR PROGRAMS BETWEEN STEPS 10 AND 8999. 5 6 TO CSAVE, JUST TYPE: 7 GOTO 10000 (ENTER> 8 ***** 8999 END 9000 *** PROTECT SUBROUTINE JORGE MIR BY: 9020 B=PEEK (25) +256+PEEK (26) 9030 P=&H200 9040 POKE&H9D. 2: POKE&H9E. 0: Y=0 9050 Y=0:FOR X=1T0389TEP2 9060 POKEP+Y. VAL ("&H"+MID\$ ("8E00 009F198E00009F1B8E0000BF00007EAE 75", X, 2)): Y=Y+1: NEXTX 9070 POKEP+1, PEEK (25): POKEP+2, PE EK (26): POKEP+6, PEEK (27): POKEP+7, PEEK (28) 9080 POKEP+11, PEEK (B): POKEP+12, P EEK(B+1) 9090 POKEP+14, PEEK (25): POKEP+15, PEEK (26) 9100 RETURN 10000 '** CSAVE SUBROUTINE ** 10010 BOSUB 9000 10020 CLS: INPUT"PROGRAM NAME"; I\$ 10030 CSAVE I\$ 10040 CLS:PRINT:PRINT"O.K., PROG RAM IS NOW SAVED." 10050 PRINT: PRINT"REWIND TAPE AN D 'CLOAD' IT AT THIS TIME." 10060 PRINT:PRINT"IF YOU GET AN 'I/O ERROR', THEN TYPE 'EXEC', P SAVE THE PROGR RESS (ENTER) AND AM AGAIN.":PRINT:PRINT 10070 POKE25, PEEK (27): POKE26, PEE K (28) : NEW 10080 POKEP+14, PEEK (25): POKEP+15 , PEEK (26)

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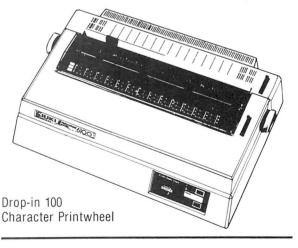
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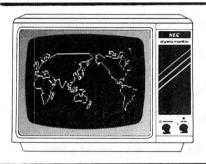
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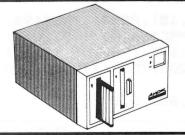
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Holiday Greetings 2

Program by Eugene Vasconi

ow many times while watching a science fiction movie have you heard a voice from out of nowhere say "Greetings from outer space!" Well, this program entited *Holiday* gives us a painting of our planet earth with an animated satellite in the foreground. As the program runs, the satellite spins and moving beams transmit a familiar holiday song to the surface of the planet. Scattered stars twinkle as the audio plays at random intervals.

Prior to CLOADing this program, it is necessary to PCLEAR8, and the length of the program dictates that nothing is added or an OM Error will occur.

With the space age (and the computer age) upon us, you will enjoy both watching and listening to this little "Holiday" animation.

-Noreen Morrison

200 0255

520.....04F0 END ... 0790

The listing:

10 CLEAR75: GOTO680

20 PMODE3,1:SCREEN1,1

30 PCLS(3):COLOR5,3

40 CIRCLE(0,196),175,5,.75,.75,.

50 PAINT(25,150),2,5

60 CIRCLE(200,35),20,5,.25

70 CIRCLE(200,70),20,5,.25,.0,.4

80 LINE(220,35)-(220,70), PSET:LI NE(180, 35) - (180, 70), PSET: LINE(20

3,35)-(198,20),PSET,B

90 PAINT(190,35),5,5:PAINT(190,5

0),4,5

100 LINE-(180, 15), PSET: LINE(198,

20)-(180,25), PSET:LINE(198,20)-(

216, 25), PSET: LINE (198, 20) - (216, 1 5), PSET: LINE (203, 75) - (198, 90), PS

ET, B

110 PAINT (200,85),5,5

(Eugene Vasconi, a free-lance television producer, holds a M.A. in telecommunications. A self-taught CoCoer for two years, he sees the computer as the art form of the future in both graphics and music. His activities in Dallas involve television production and aviation.)

120 FORX=OTO40STEP10

130 LINE(180+X,90)-(180,97),PSET

B: NEXTX

140 PAINT(185,94),1,5:PAINT(195,

94),2,5:PAINT(205,94),3,5:PAINT(

215,94),4,5

150 FORX=1T020

160 R=RND(180):S=RND(60)

170 T=RND(70)+180:U=RND(90)+100

180 PSET(R,S,5):PSET(T,U,5)

190 NEXTX

200 CIRCLE(0,176),68,5,1.3,.75,.

210 CIRCLE(0,104),60,5,.9,.95,.0

220 CIRCLE(0,150),100,5,.8,.85,.

230 CIRCLE(110,180),22,5,1,.65,.

240 CIRCLE (115, 148), 20, 5, 1, .98, .

250 LINE(135,146)-(143,155), PSET

:LINE-(150,142), PSET 260 CIRCLE(96,168),62,5,.7,.92,.

T

270 LINE(155, 180)-(168, 168), PSET

280 PAINT(10,90),5,5

290 CIRCLE(15, 195), 20, 5, 1.7, .6, 0

300 PAINT(15,190),5,5

320 FORX=60T0192:PSET(0, X, 2):NEX

TX:FORX=OT0175:PSET(X,191,2):NEX

330 PMODE3,5 340 FORX=1TO4:Y=X+4

350 PCOPY X TO Y

360 NEXTX

370 PMODE3,1:COLOR5,3

380 FORX=10T0180STEP3

390 Y=INT(100-(X/6)):Z=INT(140-(

X/2.7))

400 PSET(X,Y,4):PSET(X,Z,4)

410 NEXTX

420 FORX=80T0180STEP3

430 A=INT(260-(X/.97)) 440 PSET (X, A, 4) 450 NEXTX 460 FORX=OTD30STEP10 470 LINE(190+X,38)-(180+X,73),PS 480 NEXTX 490 FORX=1T05 500 R=RND(180):S=RND(60):PSET(R. 5,4) 510 T=RND(75)+180:U=RND(90)+100: PSET(T,U,4) 520 NEXTX 530 PMODE3,5:COLOR5,3 540 FORX=OTO20STEP10 550 SCREEN1,1 560 LINE(195+X,38)-(185+X,73),PS 570 NEXTX 580 LINE(215,73)-(220,56),PSET 590 FORX=8T0178STEP3 600 Y=INT(100-(X/6)):Z=INT(140-(X/2.7)) 610 PSET(X,Y,4):PSET(X,Z,4) 620 NEXTX 630 FORX=78T0178STEP3 640 A=INT(260-(X/.97)):PSET(X.A. 4):NEXTX

650 FORX=1T05 660 R=RND(180):S=RND(60):PSET(R. 5,4) 670 T=RND(75)+180:U=RND(90)+100: PSET(T.U.4): NEXTX 675 GOTO700 680 DIMA\$ (63) 690 FORQ=1TO63:READA\$(Q):NEXTQ 695 GOTO20 700 Q=0 710 FORX=1T08STEP4 720 PMODE3, X: SCREEN1, 1 730 IFQ=63THEN733ELSE747 733 FORAA=1T020: NEXTAA 745 A=RND(100): IFA=12THEN Q=0ELS E760 747 Q=Q+1 750 PLAY"L40; 05; XA\$(Q);" 755 FORP=1T010:NEXTP 760 NEXTX 770 GOT0710 780 DATA E,E,E,G,E,E,E,G,E,G,C,D ,E,E,E,E,F,F,F,F,F,E,E,E,E,D,D,E ,D,G,F,D,E,E,E,G,E,E,E,G,E,G,C,D ,E,E,E,E 790 DATA F,F,F,F,F,E,E,E,G,G,F,D .C.C.C

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151



Prompted Graphics Program

By Don Inman

s you sit down at your Color Computer to enter what may turn out to be your favorite program, pause for a few moments for a little planning. Reflect upon the fact that you might want to save your program and use it again at some later date. When the time comes, will you remember what the program does and how to use it? Will you remember what values are to be entered for any variables that you may have used? Maybe you'll want to show your program off to someone else. Will they know what should be entered from the keyboard?

A well-documented program should not only have lots of meaningful REM statements that show up in a listing, but also lots of easy to read prompts and clear menus from which to make selections. I realize that most of my own programs do not measure up to this advice. However, I will promise to improve in this respect if you will also.

A typical example would be an Extended Color BASIC graphics program. There is a certain amount of detail work that must be done before the desired graphics can be displayed. The correct mode must be selected from a list of five: PMODE 0, PMODE 1, PMODE 2, PMODE 3, and PMODE 4. Each mode differs from the others in one or more of the following ways:

- 1) the number of pixels (the smallest graphic element),
- 2) the size of the pixels, and
- 3) the number of colors available. Table 1 shows the variations possible.

Table 1 — GRAPHIC MODES

PMODE	Row and Column Size	Number of Colors	Pixel Size
PMODE 4	256 by 192	2	
PMODE 3	128 by 192	4	
PMODE 2	128 by 92	2	
PMODE 1	128 by 96	4	
PMODE 0	128 by 96	2	

Figure 1 — SCREEN NUMBERING

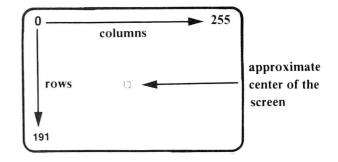


Figure 1 shows how graphic screen positions are numbered for all *PMODEs*. It also shows a pixel at the approximate center of the screen. Figure 2 shows the relative size and the X,Y positions occupied by one pixel (the shaded area) in each graphic mode.

Figure 2 — Pixel Size

PMODE 4	PMODE 3	PMODE 2	PMODE 1	PMODE 0
one X,Y	two X,Y	two X,Y	four X,Y positions	four X,Y positions

(Don Inman is the acknowledged master of micro-computer graphics and the author of a large number of books, including "TRS-80 Color Computer Graphics and Assembly Language Graphics for the TRS-80 Color Computer" with Kurt Inman.)

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Since there is such a wide variety of options, it seems logical to allow for a choice each time a program is run. Otherwise, the program itself would have to be changed each time you want to change a value for a new run. We will start building a subroutine that can be saved for use with any graphic program that you might have. We can have the main program jump right to the subroutine which uses the text screen to prompt for the choices.

We know that the subroutine should let us choose the *PMODE* number. Then we can run the program with any *PMODE* we choose. The *INPUT* prompts should name the *INPUT* and give a range of acceptable *INPUT* values. The main program and the subroutine might start like this.

Main Program

100	REM * SAMPL	E PROGRAM	*
110	•		
120	GOSUB 10000		go choose the options
130	PMODE PN	4	PN from line 10040

Subroutine

10000 REM * SUBROUTINE FOR
100010 REM GRAPHIC OPTIONS *
10020 ,
10030 CLS clear the text screen
10040 INPUT "PMODE NUMBER 0-4"PN first input

After the *PMODE* (the variable PN) is selected, you will probably want to clear the graphics screen. Extended Color BASIC allows you to clear the graphics screen to any one of four background colors in a four-color mode (*PMODE3* or *PMODE1*). The screen may be cleared to one of two background colors in a two-color mode (*PMODE4*, *PMODE2*, or *PMODE0*). The statement for clearing the screen is: *PCLS* n

n = color value chosen from Table 2

There are two color sets that may be used (numbered 0 and 1). The colors available in each set depend upon which *PMODE* is being used. The color set is selected by the *SCREEN* statement.

SCREEN n,m

$$n = 0$$
 for text screen $m = 0$ selects color set 0
 $n = 0$ for graphics screen $m = 1$ selects color set 1

The color values of Table 2 are also used to select background or foreground colors for each of the five *PMODE*s. The desired color is selected from the appropriate color set.

Table 2 — Graphic Colors

PMODE	COLORSET	COLORS
1 or 3	0	1 = green, 2= yellow 3 = blue, 4= red
	1	5 = buff, 6 = cyan, 7 = magenta, 8 = orange
0, 2, or 4	0	0 =black, 1 = green
	1	0 = black, 5 = buff

The screen and color selections are added to the subroutine and to the main program to give the following:

Main Program

```
100 REM *SAMPLE PROGRAM*

110 '

120 GOSUB 10000

130 PMODE PN — mode

140 PCLS BK — background

150 SCREEN 1, SC — graphic color set

160 '

999 END — separate end of program from subroutine
```

Subroutine

```
10000 REM *SUBROUTINE FOR
10010 REM
            GRAPHIC OPTIONS*
10020 "
10030 CLS
             "PMODE NUMBER 0-4";P
10040 INPUT
                            accept 0 through 4
10050 IF PN<0 OR PN>4 THEN 10040 1
10060 INPUT "COLOR SET 0 OR 1";S
C
                            accept only 0 and 1
10070 IF SC<0 OR SC>1 THEN 10060 *
10080 INPUT "BACKGROUND COLOR O-
8"; BK
10090 IF BK<1 OR BK>8 THEN 10080
                            accept 0 through 8
10200 RETURN
```

One other possible input choice would be the value of the foreground color to be used. This can be selected by the *COLOR* statement.

The acceptable range of values for the foreground color are also dependent on the color set being used. Values from Table 2 are used.

Add to the Main Program:

160 COLOR FG, BK←same background selected in Line 10080
★ foreground selected by subroutine Line 10100
Add to the SUBROUTINE:

10100 INPUT "FOREGROUND COLOR 0-8";FG 10110 IF FG<0 OR FG>8 THEN 10100

The complete subroutine is now:

10000 REM *SUBROUTINE FOR
10010 REM GRAPHIC OPTIONS*
10020 ,
10030 CLS
10040 INPUT "PMODE NUMBER 0-4";P
N
10050 IF PN<0 OR PN>4 THEN 10040
10060 INPUT "COLOR SET 0 OR 1";S
C
10070 IF SC<0 OR SC>1 THEN 10060

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You may fill in whatever graphic design that you wish for program lines 160 through 999. Here is an example that draws 25 magenta blocks on an orange background at random positions on the screen. The inputs will produce these graphics values:

PMODE 3 — high resolution, 4 colors SCREEN 1,1 ← color set 1 COLOR 7,8 magenta foreground on the orange background

Main Program

```
100 REM *SAMPLE PROGRAM*
110 "
120 GOSUB 10000
130 PMODE PN
140 PCLS BK
                      Variables input in subroutine
150 SCREEN 1,SC
160 COLOR FG, BK
```

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```
170 FOR N=1 TO 25
180 X=RND(240): Y=RND(180)
190 LINE(X,Y)-(X+10,Y+10),PSET,B
200 NEXT N
210 '
220 FOR WAIT=1 TO 1000:NEXT WAIT
999 END
```

Add the subroutine (as last shown) and run the program several times using different inputs each time. This will allow you to decide which values produce the best results. Here is how the input display looked before the graphics were drawn.

PMODE NUMBER 0-4?3 COLOR SET 0 OR 1?1 **BACKGROUND COLOR 0-4?8**

The main program may be changed to display any screen design that you want. Next month we'll take a look at the use of menus.

> 1000 ... 00E0 **END ...01EB**

The listing:

10200 RETURN

```
100 REM *SAMPLE PROGRAM*
110 2
120 GOSUB 10000
130 PMODE PN
140 PCLS BK
150 SCREEN 1,SC
160 COLOR FG, BK
170 FOR N=1 TO 25
180 X=RND(240): Y=RND(180)
190 LINE(X,Y)-(X+10,Y+10),PSET,B
200 NEXT N
210 '
220 FOR WAIT=1 TO 1000:NEXT WAIT
999 END
10000 REM *SUBROUTINE FOR
10010 REM
           GRAPHIC OPTIONS*
10020 3
10030 CLS
10040 INPUT "PMODE NUMBER 0-4";P
10050 IF PN<0 OR PN>4 THEN 10040
10060 INPUT "COLOR SET 0 OR 1";S
10070 IF SC<0 OR SC>1 THEN 10060
10080 INPUT "BACKGROUND COLOR O-
8"; BK
10090 IF BK<1 OR BK>8 THEN 10080
10100 INPUT "FOREGROUND COLOR 0-
8";FG
10110 IF FG<0 OR FG>8 THEN 10100
```

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By Norman Matice

one Fishing is a high resolution game for a 16K ECB Color Computer. The object of the game is to catch as many fish as you can before it's time to go home for dinner. You control the line with the right joystick. Push it forward to let more line out and pull it back to reel in your line. Unfortunately, someone forgot the bait, so you will have to hook the fish as they swim by.

If a fish should swim across your line it will seem to disappear, because of the turbulence. Actually, redrawing the line would slow play down to an unacceptable level. If your machine can use the high speed poke (POKE 65495,0) then play is greatly enhanced.

Lines 1-80 of the program do a general set up of the computer. They dimension arrays, initialize variables, and select resolution, graphic screen and color set. Lines 90-190 draw the title. Lines 200-450 draw the hook, person in the boat, the boat, the pole and the fish. Lines 480 and 490 put the boat on the water. Line 500 randomly selects the end value for the outer loop of a nested FOR/NEXT loop. Line 510 then limits your time fishing to the number of passes by the fish as set up in Line 500. To increase the length of the game, add a larger number to IN in Line 500. Lines 520 and 530 randomly pick the depth at which the fish will cross and make sure they stay on their part of the screen.

The game starts at Line 540 where the inner FOR/NEXT loop directs the motion of the fish. Lines 550-570 control the fishline and Lines 580 and 590 check the end of the hook. Lines 600-620 draw the hook and line on the screen. Lines 630-670 draw the fish and move them across the screen. Lines 690-770 go to the text screen, print the score and ask if you would like to try again. From here the program either repeats or ends depending on the player's choice.

The only thing left is the subroutine called in Line 590, if

(Norman Matice is a junior at the University of Alabama—Huntsville, majoring in electrical engineering.)

you have hooked a fish. Lines 1000 and 1010 take the other fish off the screen. Line 1020 puts the fish you caught on your hook. Line 1030 provides a cranking noise for your reel. The rest of the program is relatively quiet, because fishing is a quiet sport. Lines 1040-1070 control the reeling in of your catch. Lines 1090 and 1100 automatically take the fish off your hook for you. Line 1110 keeps track of how many fish you have caught and of course Line 1120 takes you back to the main program.

Now, wet your line and have fun, but remember—don't stand up in the boat!

200.....020D 580.....059F END ...0867

The listing:

1 '"GONE FISHING"

2 ' by NORMAN MATICE

3 APRIL, 1983

10 DIMA(50),B(50),C(50),G(100),M

(10),N(50),S(50)

20 T=0

30 K=40

40 PCLS

50 PMODE 3,1

60 SCREEN 1,0

70 COLOR 2,3

80 PCLS

90 DRAW"BM40,60;U8R8BD4L4BR4D4L8

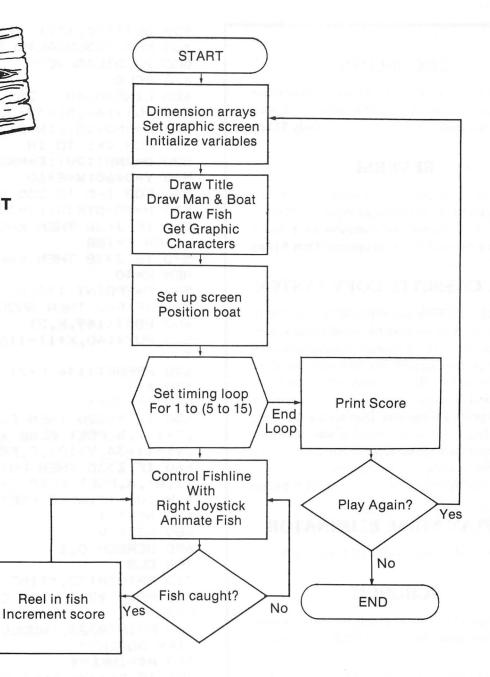
100 DRAW"BM55, 60; U8R8D8L8"

110 DRAW"BM70, 60; U8F8U8BG8"

120 DRAW"BM85, 60; UBR8BD4L8BR8BD4 L8"

130 DRAW"BM115,60;U8R8BD4BL4L4BD





```
140 DRAW"BM130,60; BU8R8BL4D8BR4L
150 DRAW"BM145, 60; BU4U4R8BD4L8BR
8D4L8"
160 DRAW"BM160,60; U8BR8D8BU4L8BD
4"
170 DRAW"BM175,60;BU8R8BL4D8BR4L
180 DRAW"BM190,60; USF8U8BG8"
190 DRAW"BM205,60; U8R8BD4L4BR4D4
L8"
200 CIRCLE(128,96),8
210 CIRCLE(130,130),5,,1.75,0,.5
220 GET(125,129)-(135,135),M,G
230 PSET(126,94,2):PSET(130,94,2
240 LINE(126,97)-(130,97), PSET
250 LINE(124,86)-(132,88),PSET,B
```

Reel in fish

```
260 LINE(120,89)-(136,89), PSET
270 DRAW"BM128,104; NG5ND5F5"
280 CIRCLE(128,109),35,,.35,0,.5
290 LINE (93, 109) - (163, 109), PSET
300 PAINT(128,111),4,2
310 DRAW"BM125,109;H25D35"
320 GET (93,86) - (163,120), G, G
330 GET(0,0)-(34,10),C,G
340 CIRCLE(163,130),10,,.5
350 DRAW"BM169,135;E10D10H10"
360 PSET (160, 130, 2)
370 GET(154,125)-(188,135),A,G
380 CIRCLE(93,130),10,,.5
390 DRAW"BM88,135;H10D10E10"
400 PSET (97, 130, 2)
410 GET(72,125)-(106,135),B,G
420 CIRCLE(128,150),8
430 DRAW"BM128, 156; NG6F6L12"
440 PSET(128,148,2)
```

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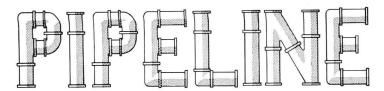
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450 GET(120,142)-(136,168),N,G
460 PLAY"03L8GAL4GL2EG04L4CL2EL4
DCCL2DC03L4AL2G"
470 PCLS
480 LINE(0,40)-(255,40),PSET
490 PUT(140,5)-(210,40),G,PSET
500 D=RND(10): IN=0+5
510 FOR V=1 TO IN
520 D=RND(120):E=RND(120)
530 Y=D+60:W=E+60
540 FOR I=5 TO 255 STEP 5
550 H=J0YSTK(0): J=J0YSTK(1)
560 IF J<26 THEN K=K+1 :IF K>188
 THEN K=188
570 IF J>38 THEN K=K-1 : IFK<40 T
HEN K=40
580 P=PPOINT(140,K)
590 IF P=2 THEN GOSUB 1000
600 PSET(149,K,2)
610 PUT(140,K+1)-(150,K+6),M,PSE
620 PRESET (146, K+7)
630 X=I
640 Z=255-X
650 IF X<220 THEN PUT(X,Y)-(X+34
,Y+10),B,PSET ELSE X=220 : PUT(X
,Y)-(X+34,Y+10),C,PSET
660 IF Z>35 THEN PUT(Z-34,W-10)-
(Z,W),A,PSET ELSE Z=35 : PUT(Z-3
4, W-10) - (Z, W), C, PSET
670 NEXT I
680 NEXT V
690 SCREEN 0,1
700 CLS
710 PRINT@172, "TIME IS UP!"
720 PRINT@231, "YOU CAUGHT "; T; "
FISH!"
730 PRINT@323, "WOULD YOU LIKE TO
 TRY AGAIN?"
740 As=INKEYs
750 IF A$="Y" THEN RUN
760 IF A$="" THEN 740
770 CLS:END
1000 PUT(X,Y)-(X+34,Y+10),C,PSET
1010 PUT(Z-34,W-10)-(Z,W),C,PSET
1020 PUT(141,K)-(157,K+24),N,PSE
1030 PLAY"05T150L4ADP4"
1040 H=JOYSTK(0):J=JOYSTK(1)
1050 IF J<26 THEN K=K+1: IF K>18
8 THEN K=188
1060 IF J>38 THEN K=K-1: IF K<40
 THEN K=40
1070 IF K=42 THEN 1090
1080 GOTO 1020
1090 GET(0,0)-(16,26),S,G
1100 PUT(141,41)-(157,67),S,PSET
1110 T=T+1
1120 RETURN
```

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BEEN HEARING ALL those advertisements on the radio and TV for the CoCo2? Well, it is part of what we hear is the biggest advertising blitz that Radio Shack has ever launched for a single computer. And no wonder! After all, CoCo deserves it and there is little question that it is the leader in its field. What all this means is that there will be a whole bunch of new Color Computer owners by the time you read this... and even more of them on the way. Frankly, that is a big vote of confidence from Tandy Towers on our favorite computer—and its future.

WHAT'S THE EFFECT of the demise of Texas Instruments and Atari in the personal computer market? We hear that TI will be doing what it can to dump its inventory at unheard-of prices. A good buy? We don't think so; after all, who wants a computer that will have almost no support a month from now. The only effect it can have on the CoCo market is a good one: It proves what we have been saying in these pages for some time-that when the shakeout does come, our own CoCo will still be riding high. Well, the shakeout is here now and it looks like CoCo, newly streamlined and all, is sitting high, wide and handsome. The proof of the pudding is, perhaps, in the bottom line: While Atari and TI posted huge losses in their latest financial reports, Tandy closed off the year with a 24 percent increase in profits. You can bet a healthy percentage of that was in the computer field and an even higher percentage of the computer profits came from CoCo. Our hats off to the people who are responsible for this at Radio Shack. It's certainly an excellent indication of a good job well done.

NOW WE FIND that you can receive Slow-Scan Television pictures by way of your CoCo with a new 16K machine language program authored by amateur radio operator Dick Kenny. Slo-Scan was developed for the Ham/CoCo buff who isn't quite ready to invest a lot of money in a dedicated SSTV system.

Anybody interested can probably find out more on the subject by reading A5 ATV Magazine; it's published by QCD Publications, Inc. in Lowden, Iowa. PICTURE YOUR CRT. Really. Photographically recording data from your monitor for reference or presentations has finally become a simple, exact procedure with the development of the DATA-CAM™ I and DATACAM™ 35, two color graphic recording cameras from Photographic Sciences Corp. The company says all you have to do is place a DATACAM on any CRT monitor and press a button-no f-stop settings or shutter speeds to fiddle with. Now, we could handle that! You can use conventional film, but with a special film and an AutoProcessor, both available from Photographic Sciences, you can create mounted slides in minutes, working right at your desk. Both cameras come in sizes to fit almost every available monitor. You can write to them at P.O. Box 338, Webster, NY 14580 for further information.

AND SPEAKING of photography, shutterbugs now have a friend in the software business since PBK & Associates has released its new *BWDEV* Black/White Developer. *BWDEV* is a 16K Non-Extended program that will calculate the variables of the development process and time each step of the way with audible tones. It seems like a good deal for \$19.95.

Why not write the company for more info at 5603 Linwood Court, Seabrook, MD (20706) and see what develops?

Ugh. Negative humor.

AN ALARMING SITUATION is what SGM Corporation wants to prepare you for with a new security system the company is marketing. The SGM system is a plug-together, hard-wired alarm system which will provide electronic security for your CoCo, computer peripherals, and even your stereo, TV or other valuable piece of personal equipment that might have a tendency to walk off when you're not watching. Fooling around with the security system sets off a local alarm; you can connect the system to other alarms, as well. SGM is at 6 West Main Street in Bound Brook, New Jersey. The systems can cost less than \$50, or if you wish to secure a lot of valuable hardware you could spend several hundred dollars.

KEYBOARD IN A NOTEBOOK? Yes, but don't try to "enter" anything you've keyed with this one. You won't even get an I/O Error. Computer Practice Keyboard Co. of Union City, NJ, has brought out a line of "keyboards" printed on heavy, plastic laminated sheets, following the layouts of the keyboards of the most popular personal computers, including TRS-80s. The 81/2 x 11 sheets are three-hole punched to fit in a standard binder and could be handy for practicing finger positions on a new keyboard while away from the computer, or for studying the keyboard of a computer you may be thinking about buying. They're \$3.95 (or two for \$7.50) plus \$1 for postage. The company's

address is 616 9th Street in Union City.

AN ENHANCED VERSION of Derringer Software's popular Pro-Color-File is now on the market, the result of many comments and suggestions they received from users of the original versions. This new database development package can define up to 60 data fields to be stored within each record. It also contains 28 math equations for making easy calculations as records are entered. There are additional report and label generating formats and record indexing capabilities. It even has a menu that can be tailored to an established database so that those not involved in setting up the program can use it. We're looking for a version that will eliminate the Federal deficit and organize our checkbook for a permanent positive balance.

ONE OF THE BEST innovations we've seen in an Adventure game is what Mark Data Products has done with a number of its former "word" Adventures, Black Sanctum and Calixto Island, plus a new one called Shenanigans. These now combine the best graphics we've seen in an Adventure—real movement and actual scenes as to where you "are" that are a first in the CoCo (or any) marketplace. Best of all, they run from memory—so the cassette version is just as good as the one on disk. Our hat's off to Mark Data for these.

THE FIRST VERSION OF BASIC available for CoCo OS-9 systems has been released from Computerware. The utility is called *Random Basic* and is very much like the BASIC that Computerware made available for FLEX systems under the same name.

What Are Those Device Numbers For?

Donald D. Dollberg

odel I, III, 4 users often comment about the loss of the *LPRINT* command (allows a BASIC program to send data to the printer) from CoCo's vocabulary. As you know, this function is performed by the command *PRINT #-2*. This modification by Microsoft adds additional versatility to our friendly computer which is not possible with the Models I, III, and 4, sad to say, the Micro Color Computer, MC-10. Now you're probably saying so what — a few extra characters to type. Let's examine what we mean by device numbers and I believe you will see the advantage.

Device numbers allow the user to write a program independent of the source of input or output. For example, suppose you have a program which you want to accept input from either tape, disk or the keyboard and want to give the user the option to choose the device he wants. That's where device numbers come in handy. Before we get much further along, the following table lists CoCo's device numbers:

DEVICE	USE
-2	PRINTER
-1	TAPE I/0
0	KEYBOARD/SCREEN
+1 TO 15	DISK I/0

Using these device numbers, we can control the source for *INPUT* or *LINE INPUT* statements and the destination of *PRINT* and *WRITE* (disk) statements. For example:

PRINT #0, "COLOR COMPUTER" PRINT #-2, "COLOR COMPUTER"

The first statement prints to the screen while the second prints to the printer. Now we all know that no one uses device number 0 as shown above, since the simple PRINT statement will produce the desired result. This is because the default device number for I/0 is 0.

(Don Dollberg, a commissioned officer with the U.S. Public Health Service, holds a PhD in inorganic chemistry. He has been involved with computers since the early 70s. With Richard White, he is co-author of the TIMS database management program.) Now for the "magic." Did you know that the device number can be replaced with a variable! In so doing, the two PRINT statements above can be combined in one statement:

PRINT #D, "COLOR COMPUTER"

D can be set to -2 when printing to the printer or set to 0 when printing to the screen. On the Model I/III/4 machines you would have to use the following code in place of the simple statement above, for example:

IF D=0 THEN PRINT "COLOR COMPUTER" ELSE IF D=-2 THEN LPRINT "COLOR COMPUTER"

The use of the variable D can be expanded to include tape and disk. As an example, suppose we have a database management program (DBM) which like any good DBM has the

"[With] an appreciation of device numbers and their usage, you can very easily modify your favorite program . . ."

capability to print reports in a variety of user selected formats. However, no matter how good the DBM, there is always a report format that we would like which the DBM doesn't have. In this case we would like to incorporate the DBM output, say a table of data, into a previously prepared manuscript using our trusty word processor. By simply changing the device number, the output to the printer can be sent to tape or disk where it is stored as an ASCII file (data) and can be read by almost all word processors. The following code shows how simply and effectively this can be

accomplished.

- 10 CLS: PRINT "SEND REPORT TO:": PRINT"<1>
 PRINTER": PRINT "<2>DISK": PRINT "<3>
 TAPE"
- 20 Z\$=INKEY\$: IF Z\$="" THEN 20 ELSE Z=VAL (Z\$)
- 25 INPUT "ENTER FILE NAME";F\$
- 30 ON Z GOTO 40, 50, 60
- 40 D=-2: GOTO 70
- 50 D=+1: GOTO 70
- 60 D=-1
- 70 OPEN "0", #D, F\$
- 80 PRINT #D,---

200 CLOSE #D

Let's look at this code in detail. Line 10 is obviously a very crude menu for selecting the output device. Line 20 is the usual *INKEY* routine to obtain a character from the keyboard and convert that character to an integer. A good program would add code to check that only keys 1-3 are accepted. Line 25 simply requests the file name. Depending on which key was pressed, Line 30 selects the appropriate device definition (Lines 40-60). This leads to Line 70 where we open the file with name F\$ and device D. Although the *OPEN* statement is not needed when printing to the screen or printer, it is, of course, needed for tape and disk file I/0 and causes no error when using screen or printer.

After opening the file, the program can now continue with

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This is the UPLOAD side of DLOAD and DLOADM in Extended Color Basic. Send a basic or machine program to another ECB Color Computer. Programs can be passed directly or by phone if both computers are hooked to modems. (not supplied). Uploaded program arrives at the receiving end ready to save, run, or execute. Patch to correct the flaw in DLOADM is supplied in public domain.

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Program produces a sorted list of variables and line numbers used in your basic program. Following each variable or line number will be a listing of the numbers of the basic lines which contain the variable or line number. RUNning the basic program is not required. Bonus! Global search of basic program for a variable, a text string, or a basic keyword.

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its printing task independent of device as long as each *PRINT* statement uses the variable D for device number. If you use the simple *PRINT* without a device number, the data will be printed to the screen. For input, one can do the same thing with *INPUT* or *LINEINPUT* statements in place of *PRINT*.

While all of this sounds great, Murphy's laws do occasionally strike computers. Disk users are aware of the additional output command *WRITE*, which functions differently from *PRINT*. *WRITE* accepts all device numbers that *PRINT* does and can be used in place of *PRINT*. However, *WRITE* and *PRINT* are not completely interchangeable so it is wise to understand the two before deciding which to use.

Now that you have an appreciation of device numbers and their usage, you can very easily modify your favorite program so that you can examine a report on the screen before printing or save a report to tape or disk instead of printing. On input you can easily have data input from keyboard or from tape/disk. All of this can be done by simply changing the value of a variable. Unfortunately, most programs don't incorporate a variable for device specification. With a good search program you can examine a program and replace all *PRINT* statements with *PRINT#D* and add code similar to that given above to select D.

Software authors take note. You can add much more capability to your program (and make life easier for the user) by simply adding a variable for the device number and give the user the option of controlling the source and destination of data.

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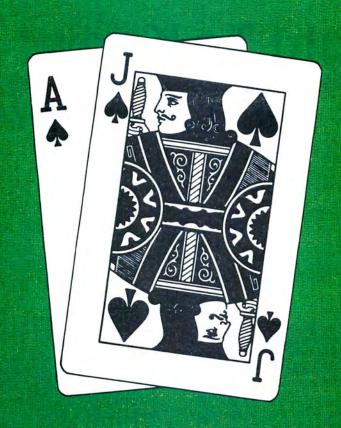
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The Right To Know: It's Also An Obligation

By Tom Nelson Rainbow Contributing Editor

ut in the regular world we're all pretty secure with our purchases. We go into a supermarket, discount house or whatever and buy a product we can feel and see to be good. We also have some notion of what went into the product and some idea of the market for the product. This makes us feel secure that we are buying a quality product for a reasonable price.

Buying computer software and hardware is just not the same. Consumers are adrift without much help or guidance. It is hard to know if the software or hardware is exactly what we want, even if we have it in our hands, much less when it is in a package. The average consumer does not know what it took to make the product or how many units will be sold. Thus, there is no way to know if the product is priced right or fairly. This ignorance is frustrating and can lead to poor decisions and resentment.

Add to this several other factors and there can be a lot of misunderstanding and dissatisfaction. First, many of us buy through mail order, thus stopping us from seeing the product in advance. Furthermore, software, at least, can be volatile when on disk or tape, leading to insecurity about the product. Also, our expectations from other mature industries are applied to the immature computer industry. When these expectations are inevitably not met, frustration ensues.

Being a consumer in the Color Computer market is tough! In this article I hope to explain the Color Computer market and some industry practices and their reasons so that you the consumer will better be able to assess potential purchases.

The cost of any product is directly related to how many units will be sold and how long it takes to develop the product. Obviously, if only one unit of a product will be sold and it takes two years to develop it, the product will be very

(Tom Nelson was formerly a special assistant attorney general for the State of Minnesota. He currently is general counsel for Softlaw Corporation, makers of the VIP Library™, and of ColorQuest™ games.)

expensive. So let's look at the market and development costs for products for the Color Computer.

For our example let's talk about marketing a board which turns the Color Computer into a Cray supercomputer. Due to a giant breakthrough a company has discovered that this board can be made in two years if two people work on it full time. So what is the market for this board?

Well, first, how many Color Computers are there? Who knows? Let's say, just for argument, that there are 300,000. Okay, wow! There are potentially 300,000 people who will buy the card! But wait—how many people really want or can use the card? Well, the card requires 64K and Extended BASIC. That cuts out at least 50 percent of all Color Computer owners. The card also requires a disk drive. There goes another 40 percent. Now we're down to at most 90,000 people who might buy the card.

So now we have to reach those 90,000. How do we do that? In the Color Computer market, primarily through magazine advertisements, and less so with dealers. Remember that the manufacturer cannot just go to a Radio Shack store and sell his product. Back to that 300,000 figure for owners of Color Computers? Well, really, only about at most one-third, or 100,000 can be reached through magazines and dealers. This is according to the magazines' own claims that they have up to 100,000 circulation. Thus, of those 90,000 we have left who have the right size machine, only about 40 percent or so can be reached at all. Now we're down to a market size of 36,000 folks who you are able to interest at all. Of those, 50 percent don't want a Cray card. Instead they want a Control Data card. Now you have 18,000 potential customers.

The whittling will continue until the company can expect sales of about 4,000 units over the product's lifetime. So what do they charge, if they decide to market the Cray card at all? Well, development takes two years for two persons, sales, the development cost goes to \$20 per unit. In addition, full time. There's \$80,000. Divided by the 4,000 expected

each unit will cost \$50 to manufacture, another \$10 to package, another \$5 to distribute, \$8 to process the order, \$4 to advertise, and so on. Now we have a Cray card costing about \$60 to produce plus \$40 to develop, for a total of \$100 per card

In order to continue to develop more products of equal high quality, the manufacturer needs to make a profit. The profit has to come after the sale, and don't forget that the distributor wants a 60 percent discount. So what price is charged? Well, the \$100 plus the profit may only be 40 percent of the final price. Assuming a profit of 20 percent, giving a distributor cost of \$120, the final price must be \$300 retail.

Oops, I forgot one thing. Once this board gets out there the manufacturer is going to have to give support. Even with the best of operation manuals there are going to be some questions and problems. And what of the returns and exchanges because of the bugs? A conservative cost for these would be \$40 per unit to the manufacturer. Add another \$100 to the retail price:\$400. Of course, the manufacturer could refuse to give support and charge a lower price, but manufacturers have learned that the consumer will demand \$40 of support even if they only paid \$40 for the product. Thus, support may as well be given, and considered when determining the cost of the product.

And what does the consumer get for that hard earned, top dollar \$400? A thin little board with a few chips thrown on, and some weird wires, some photocopied sheets of paper and a phone number. What a rip off! Right? Not according to the facts.

Well there aren't many \$400 products selling for the Color Computer. Let's face it. If you only paid \$400 for your computer you are unlikely to spend another \$400 for something as stupid as a board just to turn it into a Cray supercomputer. After all, you'd rather pay the \$10 million for the Cray in the first place.

Still, you are going to buy very few products with such a price tag. In fact, I bet most of you would pay as much as \$100 only for truly exceptional products, with \$30 to \$60 products being your main purchases. What can you expect for your money?

Have you ever wondered why Visicalc, Multiplan, Wordstar, PFS File, dBase II and other well known products are available for other popular micros but are not available for the Color Computer? Have you ever wondered why the utility programs that Radio Shack sells for the Color Computer are relatively unsophisticated and inexpensive? The reason is the same. The Color Computer market does not justify the effort.

One thing those companies have learned is that people want high quality, full-featured programs and total support no matter what they pay. People invariably expect a \$60 program for the Color Computer to perform as well as a \$400 program for the IBM PC, and they expect an equal amount of support. All calc programs have to outperform Advanced Visicalc or Multiplan, the word processors have to equal Wordstar, and database programs have to be at least as good as dBase II. Those companies have decided that sales of such programs at such low prices are insufficient in the Color Computer market to justify the extensive development work and after-sale support necessary. This is especially so when those companies look at other potential markets. Thus, only a very few companies have sought to produce high quality software for the Color Computer.

Miraculously, despite such odds, many programs for the Color Computer available for about \$60 outperform their more expensive counterparts for other computers. Just as miraculously, the companies selling the products stay in existence when the programmers and developers have to work hours in addition to their full time jobs as janitors and soda jerks. Anyone who thinks that software companies developing for the Color Computer are getting filthy rich is just not well informed.

So once a company has put extensive development time into a product to give ultra high quality, has spend money on packaging, distribution, promotion, etc., etc., what's left of the \$60 you are willing to pay—or the \$25 to \$30 that the manufacturer gets from the distributor?

"Consumer rights are tied closely with consumer responsibilities."

Oh, I've forgotten to mention some other costs. Originally there is theoretically a large market for the product. But since it is estimated that only 30 to 40 percent of all software in use has been legitimately obtained, that market has to be decreased by 50 percent, assuming a 50 percent theft factor. There go some more sales which will not help pay for the development of the product.

Also, as the product develops, new versions may be produced. Introduction of new hardware may also cause a substantial rewrite. These new versions and rewrites can be very expensive. Nevertheless, the owner of a previous version expects to obtain a sizable discount on the new version, if not get it for free. There's another part of development costs not covered fully.

And while we're here, don't forget that it costs \$3 just to answer a simple three minute WATS phone call, about \$8 just to process even the smallest order and lots of dough just to open the doors every day. That good old friend overhead must also be considered an added cost for the product.

Well, where are we? We've just come home from a long week at the office. Time to live it up. Honey, get me a drink—no—let's go out tonight and have some fun. Dinner out, to the movie, to a night club afterwards for a night cap, sixty bucks gone for good, and well spent!

Now it's Saturday morning in front of the computer for some hacking. Got to find that right program to do exactly what my mainframe at work does, but on my Color Computer. Never mind that the mainframe program costs at least \$10,000 and needs lots of support. The one for my Color Computer has to do the same thing, last a lifetime, be fully guaranteed to satisfy me, come with unending support and cost only \$60. Oh, don't forget a full, glossy, four-color user friendly manual, and of course there can be no bugs at all! In fact, I might even need the source code in case I want to modify the program for my special needs. All this for sixty bucks, the same sixty bucks that I frivolously spent last night on food and drink.

Knowing the market is only one part of the problem, since it mostly only affects how we view the cost of the products. But what of how we view the products themselves and what they will do?



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Consumers learn about products from ads, word of mouth and magazine articles and reviews. The ads are selfserving. The consumer must read them carefully and be able to ask the right questions. Word of mouth depends on the credibility and knowledge of the speaker. Then what of the objective press? How many consumers are aware that most of the reviewers for Color Computer products only deign to use a Color Computer when reviewing a product, but own and use another computer for their own purposes? This is very true, especially when dealing with the more sophisticated software. Consumers must question why they can trust the opinion of someone who refuses to use the Color Computer and its products except for the slight period necessary to make money reviewing a program.

But then what of those reviewers devoted to the Color Computer who have used nothing else? They are hardly any better. They are often too inexperienced to adequately assess the quality of a product. They have never used another similar program on another computer, and so have unrealistically low expectations of the program being reviewed. This leads to those glowing reviews which, when relied upon, lead to bad buying choices.

The best way to take care of this problem is to request that the credentials of the reviewer be displayed. What computer do they use at home? How many computers and similar programs have they had experience with? The answers to these questions will better help the consumer decide if the reviewer has any credibility.

This discussion points in one direction. Perspective, we've got to have some perspective. Consumer rights are tied closely with consumer responsibilities. The consumer has the obligation to at least have a marginal understanding of the market to know what to expect, and to make sure the information received from the objective press be based on experience mixed with a total understanding of the Color Computer.

I hope that this discussion has helped give you a better grasp on the confusing and fluctuating Color Computer market. With some of these considerations in mind you are ready to objectively assess the value for your buck. Perhaps the phrase "ripoff" will be reserved for those truly rare occurrences, and the remedies at your disposal will be used for those instances where they really will do some good.



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Spell Out

Your Error Messages

By Richard Smrcina

ne of the things that originally turned me off to Radio Shack computers was the way they decided to alert you of an error in your program. I admit that two character codes are easier to program than full-blown error messages, but we have to learn all those codes, and some of the Disk BASIC error codes are not much of an indication of the error at hand. The Atari computers (at least the 400 and 800) use numeric error codes which are even harder to understand.

Which brings me to the programs that I developed. They are designed to provide the computer with full text error messages. They also work from inside BASIC programs to print error messages at a particular line number.

I realize that all but beginners would have probably memorized most of the codes by now, but I wrote the routine anyway, to test my prowess at machine language.

There are two programs—one is for Extended BASIC users and the other is for Disk Extended BASIC users. The difference is the expanded error message table and the steps that are performed after an error has occurred.

The first thing to do before one uses the program is to reserve enough memory for the routine. An easy way to accomplish this is with a BASIC boot-strap program. All this does is automatically clear memory, load the program, and execute it. The one that I use looks like this.

- 10 CLEAR 779,31988
- 20 LOADM "ERRMSG.BIN"
- 30 EXEC
- 40 NEW

Save this program on disk and just *RUN* from BASIC and you do not have to worry about remembering the addresses every time you want to use the routine. For tape users, the bootstrap would look like this:

10 CLEAR 519,&H7DF8

- 20 CLOADM "ERRMSG"
- 30 EXEC
- 40 NEW

All 16K users should note that the &H7 must be replaced by a &H3. Make sure that the machine language program follows the BASIC program on tape.

Here is a description of how the routine works. The program first replaces the RAM hook for the error-handling routine with the address of the new routine (Lines 30-60). Then BASIC is given control. When an error is triggered, instead of going to the ROM Error message routine, my routine is encountered through the RAM hook. Lines 110-180 are BASIC's clean-up routines. This closes files, resets devices, prints the familiar "?" before the error message, etc. Lines 240-260 obtain the address for the error message table and error message respectively. Line 270 jumps to a routine to print out the message. Line 280 gets the address of "Error" text, and again the print routine is called to print it out. Line 300 returns to BASIC's error handler which at that point checks if a program is currently running, if there is, it determines at which line it crashed and prints the "IN XXXXX" message, where "XXXXX" is the line number in which the BASIC program was terminated. Afterwards, the computer is returned to command mode.

This outline follows the disk routine, but the cassette routine is very similar, it just uses some different clean-up routines.

I hope this is helpful.

Listing 1:

7CF3

00010 # NAM ERRMSG

00020 * ERROR MESSAGE ROUTINE FOR DISK BASIC USERS

00030 * WRITTEN BY RICH SMRCINA, AUGUST, 1983

00040 ORB \$7CF3

					****	**	44054	F00	400
	A002	00050 PRTCH		\$A002	7E90 7E91	49	00850 00860 IE	FCB	/IMPUT PAST END OF FILE/
7CF3 30	8D 0004	00060 START	LEAX	START1,PCR LOAD ADDRESS OF NEW ERROR ROUTINE	7EA7	0300	00870	FDB	\$0D00
7CF7 BF	0192	000 70 ≠ 000 80	STX	\$0192 REPLACE IN RAM ERROR HOOK	7EA9	44	00880 DS	FCC	/DIRECT STATEMENT/
7CFA 39	0172	00090	RTS	BACK TO BASIC	7EB9	0000	00870	FDB	\$0D00
			RY POINT	FOR ERROR ROUTINE	7EBB	55	00900 UF	FCC FCB	/UNDEFINED FUNCTION/
				O THE 'PRTHSS' LABEL IS THE SERIES OF	7ECD 7ECE	00 46	00910 00920 NE	FCC	#00 /FILE NOT FOUND/
				AT BASIC USES PRIOR TO PRINTING ERROR	7EDC	00	00930	FCB	\$00
7CFB 35	20	00130 # HE		.E. CLOSE FILES, CLEAN UP, PRINT '?'	7EDD	42	00940 BR	FCC	/BAD RECORD NUMBER/
7CFD BD	AD33	00150	JSR	>\$AD33	7EEE	0000	00950	FDB	\$0D00
7000 BD	DIES	00160	JSR	>*D1E5	7EF0	44	00960 DF	FCC	/DISK SPACE FULL/
7003 34	24	00170	PSHS	Y, B	7EFF	00 4F	00970	FCB	\$00
7005 BD	CA3B	00180	JSR	>\$CA3B	7F00 7F13	0000	00980 DB 00990	FCC FDB	/OUT OF BUFFER SPACE/ \$0D00
7008 30 700A BD	62 A7E9	00190 00 200	LEAX JSR	2,S >9A7E9	7F15	57	01000 WP	FCC	/WRITE PROTECT/
7000 BD	A974	00210	JSR)\$A974	7F23	42	01020 FN	FCC	/BAD FILENAME/
7010 OF	6F	00220	CLR	(\$6F	7F2F	00	01030	FCB	\$00
7012 BD	395C	00230	JSR	>\$B95C	7F30 7F42	42 0000	01040 FS 01050	FCC FDB	/BAD FILE STRUCTURE/ \$0D00
7015 BD	B9AF	00240	JSR	>*B9AF	7F44	46	01060 AE	FCC	/FILE ALREADY EXISTS/
7018 35 701A 4F	04	00250 00260	PULS CLRA	B RETRIEVE ERROR CODE	7F57	0000	01070	FDB	\$0D00
701B 31	80 028F	00270 PRTMS		ERRADR, PCR LOAD ADDRESS OF ERROR	7F59	46	01080 FD	FCC	/FIELD OVERFLOW/
7515 01	02 0202	00280 *	U LLIII	MESSAGE ADDRESS TABLE	7F67	00	01090	FCB	\$00
7DIF 30	B5	00290	LEAX	[B,Y] LOAD ADDRESS OF ERROR MESSAGE	7F68 7F81	53 0000	01100 SE 01110	FCC FDB	/SET TO NON-FIELDED STRING/ SODOO
7021 BD	7D2E	00300	JSR	PRTRTN PRINT MESSAGE AT ADR IN X	7F83	56	01120 VF	FCC	/VERIFY/
7D24 30	8D 02D1	00310	LEAX	ERRIXI, PCR LOAD ADDRESS OF 'ERROR' TEXT	7F89	00	01130	FCB	\$00
7028 BD 7028 16	7D2E 2F3D	00320 00330 CLEAN	JSR U I RPA	PRTRIN PRINT MESSAGE AT ADR IN X SACAB BACK TO BASICS ERROR HANDLER	7F8A	57	01140 ER	FCC	/WRITE DR INPUT PAST/
702E A6	80	00340 PRTR1		,X+ BET CHAR.	7F9D	OD	01150	FCB	\$0D
7D30 27	06	00350	BEQ	ENDPRT IF END RETURN	7F9E 7FAC	20 00	01160 01170	FCC FCB	/ END OF RECORD/ \$00
7032 AD	9F A002	00360	JSR	EPRTCHRI PRINT IT	TENC	00			ROR MESSAGE ADDRESSESS
7D36 20	Få	00370	BRA	PRTRIN LOOP AGAIN	7FAD	7039	01190 ERRADR		NF
7038 39		00380 ENDP		ROR MESSAGES	7FAF	7D4B	01200	FDB	SN
7939	4E	00400 NF	FCC	/NEXT WITHOUT FOR/	7FB1	7952	01210	FDB	R6
7D49	0000	00410	FDB	\$0D00	7FB3	7068	01220	FDB	OD
7D4B	53	00420 SM	FCC	/SYNTAX/	7FB5 7FB7	7074 7082	01230 01240	FDB FDB	FC OV
7051	00	00430	FCB	900	7FB9	708E	01250	FDB	OH
7052 7066	52 0000	00440 RG 00450	FCC FDB	/RETURN WITHOUT GOSUB/ \$0000	7FBB	7099	01260	FDB	ÜL
7D68	4F	00460 DD	FCC	/OUT OF DATA/	7FBD	7DA8	01270	FDB	BS
7073	00	00470	FCB	900	7FBF	7DB6	01280	FDB	DD
7074	46	00480 FC	FCC	/FUNCTION CALL/	7FC1 7FC3	7DCB 7DDA	01290 01300	FDB FDB	DO ID
7D81	00	00490	FCB	\$00	7FC5	7DE9	01310	FDB	TM
7082 708a	4F 00	00500 OV 00510	FCC FCB	/DVERFLOW/ \$00	7FC7	7DF7	01320	FDB	OS
7D88	4F	00520 DM	FCC	/OUT OF MEMORY/	7FC9	7E0C	01330	FDB	LS
7098	00	00530	FCB	\$00	7FCB	7E1C	01340	FDB	ST
70 99	55	00540 UL	FCC	/UMDEFINED LINE/	7FCD	7E30	01350	FDB	CN
7DA7	00	00550	FCB	\$00	7FCF 7FD1	7E3F 7E4D	01360 01370	FDB FDB	FD AO
7DA8 7DB5	42 00	00560 BS 00570	FCC F CB	/BAD SUBSCRIPT/	7FD3	7E5A	01380	FDB	DN
7DB6	52	00580 DD	FCC	/REDIMENSIONED ARRAY/	7FD5	7E68	01390	FDB	10
7009	0000	00590	FDB	\$0D00	7FD7	7E75	01400	FDB	FH
7DCB	44	00400 D0	FCC	/DIVIDE BY ZERD/	7FD9 7FDB	7E83 7E91	01410 01420	FDB FDB	NO IE
7DD9 7DDA	00 4 9	00610 00620 ID	FCB	\$00 /ILLEGAL DIRECT/	7FDD	7EA9	01430	FDB	DS
7DE8	00	00420 10	FCB	\$00	7FDF	7EBB	01440	FDB	UF
7DE9	54	00640 TH	FCC	/TYPE MISMATCH/	7FE1	7ECE	01450	FDB	NE
7DF6	00	00650	FCB	900	7FE3	7EDD	01460	FDB	BR
7DF7	4F	00660 BS	FCC	/OUT OF STRING SPACE/	7FE5	7EF0	01470	FDB	DF
7E0A 7E0C	0 000 53	00670 00680 LS	FDB FCC	\$0000 /STRING TOO LONG/	7FE7 7FE9	7F00 7F15	01480 01490	FDB FDB	OB WP
7E1B	00	00690	FCB	\$00	7FEB	7F23	01500	FDB	FN
7E1C	53	00700 ST	FCC	/STRING TOO COMPLEX/	7FED	7F30	01510	FDB	FS
7E2E	0000	00710	FDB	\$0000	7FEF	7F44	01520	FDB	AE
7E30	43 00	00720 CN	FCC	/CAN'T CONTINUE/	7FF1	7F59	01530	FDB	FO CC
7E3E 7E3F	42	00730 00740 FD	FCB FCC	*BAD FILE DATA/	7FF3 7FF5	7F68 7F83	01540 01550	FDB FDB	SE VF
7E4C	00	00750	FCB	\$00	7FF7	7F8A	01550	FDB	ER
7E4D	41	00760 AD	FCC	/ALREADY OPEN/	7FF9	20	01570 ERRTXT		/ ERROR/
7E59	00	00770	FCB	\$00		45			
7E5A 7E 67	44 00	00780 DN 00790	FCC FCB	/DEVICE NUMBER/ 800		52			
7E68	49	00800 ID	FCC	/INPUT-DUTPUT/		52 4F			
7E74	00	00B10	FCB	\$00		52			
7E75	42	00820 FM	FCC	/BAD FILE MODE/	7FFF	00	01580	FCB	100
7E82	00	00830	FCB	\$00	10000	7CF3	01590	END	START
7E83	46	00840 ND	FCC	/FILE NOT OPEN/	00000 T	OTAL ERROR	5		

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pose your favorite song in FOUR PART HARMONY. PETROCCI FREELANCE		Geneology Perform geneological searches Catagories: Family and given names date and place of birth, marriage	3	\$25.95
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teachers to help teach students how weather is forcast. 32K and Disk req.		Speak Up!! This is a Voice Synthesizer that will knock you off your feet. Type		\$25.95
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	10	tin	a	7 .
•	13	FYY	-	4.

		00010 *	NAM ERRMSC
		00020 # ERROR	R MESSAGE ROUTINE FOR NON-DISK USERS
		00030 # BY R	ICH SMRCINA, AUGUST, 1983
7DF8		00040	ORG \$7DF8
	A002	00050 PRTCHR	EQU \$A002
7DF8 30	BD 0004	00060 START	LEAX START1, PCR LOAD ADDRESS OF NEW ERROR
		00070 #	ROUTINE
7DFC BF	0192	00080	STX \$0192 REPLACE IN RAM ERROR HOOK
7DFF 39		00090	RTS BACK TO BASIC
		00100 # ENTR	Y POINT FOR ERROR ROUTINE
		00110 + FRD	H HERE TO THE 'PRTMSS' LABEL IS THE SERIES OF
		00120 # RDU	TINES THAT BASIC USES PRIOR TO PRINTING ERROR
		00130 * HES	SAGES, I.E. CLOSE FILES, CLEAN UP, PRINT '?'
7E00 BD	A7E9	00140 START1	JSR >\$A7E9
7E03 BD	A974	00150	JSR >\$A974
7E06 BD	AD33	00160	JSR >\$AD33
7E09 OF	6F	00170	CLR <\$6F
7EOB BD	B95C	00180	JSR >\$B95C
7EOE BD	B9AF	00190	JSR >\$B9AF
7E11 4F		00200	CLRA
7E12 31	8D 01AF	00210 PRTMSS	LEAY ERRADR, PCR LOAD ADDRESS OF ERROR
		00220 +	MESSAGE ADDRESS TABLE
7E16 30	B5	00230	LEAX [B,Y] LOAD ADDRESS OF ERROR MESSAGE
7E18 BD	7E25	00240	JSR PRTRTN PRINT MESSAGE AT ADR IN X
7E1B 30	8D 01DA	00250	LEAX ERRTXT, PCR LOAD ADDRESS OF 'ERROR' TEXT
7E1F BD	7E25	00260	JSR PRTRIN PRINT MESSAGE AT ADR IN X
7E22 16	2E46	00270 CLEANU	LBRA \$AC6B BACK TO BASICS ERROR HANDLER
7E25 A6	80	00280 PRTRIN	LDA ,X+ GET CHAR.
7E27 27	06	00290	BEQ ENDPRT IF END RETURN
7E29 AD	9F A002	00300	JSR [PRTCHR] PRINT IT
7E2D 20	F6	00310	BRA PRTRTN LOOP AGAIN
7E2F 39		00320 ENDPRT	RTS
		00330 * TABL	E OF ERROR MESSAGES
7E30	4E	00340 NF	FCC /NEXT WITHOUT FOR/
7 E4 0	0 D0 0	00350	FDB \$0000
7E42	53	00360 SN	FCC /SYNTAX/

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7E48	00	00370		FCB	\$00
7E49	52	00380	RG	FCC	/RETURN WITHOUT GOSUB/
7ESD	0000	00390		FDB	\$0D00
7E5F	4F	00400	מח	FCC	/OUT OF DATA/
7E6A	00	00410		FCB	\$00
7E6B	46	00420	FC	FCC	/FUNCTION CALL/
7E78	00	00430		FCB	\$00
7E79	4F	00440	nu:		The second secon
		1000 0177	UV	FCC	/OVERFLOW/
7E81	00	00450		FCB	\$00
7E82	4F	00460	OH	FCC	/OUT OF MEMORY/
7E8F	00	00470	2007	FCB	\$00
7E90	55	00480	UL	FCC	/UNDEFINED LINE/
7E9E	00	00490		FCB	\$00
7E9F	42	00500	BS	FCC	/BAD SUBSCRIPT/
7EAC	00	00510		FCB	\$00
7EAD	52	00520	DD	FCC	/REDIMENSIONED ARRAY/
7EC0	0000	00530		FDB	\$0D00
7EC2	44	00540	DO	FCC	/DIVIDE BY ZERO/
7ED0	00	00550		FCB	\$00
7ED1	49	00560	ID	FCC	/ILLEGAL DIRECT/
7EDF	00	00570		FCB	\$00
7EE0	54	00580	TM	FCC	/TYPE HISMATCH/
7EED	00	00590		FCB	\$00
7EEE	4F	00400	ne	FCC	/OUT OF STRING SPACE/
7F01	0000	00610	us	FDB	\$0000
7F03	53	00620	ra	FCC	/STRING TOO LONG/
7F12	00	00630		FCB	\$00
7F13	53	00640	ST	FCC	STRING TOO COMPLEX/
7F25	0000	00650		FDB	\$0D00
7F27	43	00990	CN	FCC	/CAN'T CONTINUE/
7F35	00	00670		FCB	\$00
7F36	42	00680	FD	FCC	/BAD FILE DATA/
7F43	00	00690		FCB	\$00
7F44	41	00700	ΔD	FCC	/ALREADY OPEN/
7F50	00	00710	110	FCB	\$00
7F51	44	00710	DN.		
			אט	FCC	/DEVICE NUMBER/
7F5E	00	00730		FCB	\$00
7F5F	49	00740		FCC	/IMPUT-DUTPUT/
7F6C	42	00760	FR	FCC	/BAD FILE MODE/
7F79	00	00770		FCB	\$00
7F7A	46	00780	NO	FCC	/FILE NOT OPEN/
7F87	00	00790		FCB	\$00
7F88	49	00800	ΙE	FCC	/INPUT PAST END OF FILE/
7F9E	0000	00810		FDB	\$0D00
7FA0	44	00820	DS	FCC	/DIRECT STATEMENT/
7FB0	0000	00830		FDB	\$ODOO
7FB2	55	00840	HE	FCC	/UNDEFINED FUNCTION/
7FC4	00	00850	UI .	FCB	\$00
11 64	••		A TABLE		R MESSAGE ADDRESSESS
7FC5	7570				
	7E30		ERRADR	FDB	NF
7FC7	7E42	00880		FDB	SN
7FC9	7E49	00890		FDB	RB
7FCB	7E5F	00900		FDB	OD
7FCD	7E6B	00910		FDB	FC
7FCF	7 E79	00920		FDB	OV
7FD1	7E82	00930		FDB	OM
7FD3	7E90	00940		FDB	UL
7FD5	7E9F	00950		FDB	BS
7FD7	7EAD	00960		FDB	DD
7FD9	7EC2	00970		FDB	DO
7FDB	7ED1	00980		FDB	ID
7FDD	7EE0	00990		FDB	TH
7FDF	7EEE	01000		FDB	09
7FE1	7F03	01010		FDB	LS
7FE3	7F13	01020		FDB	ST
7FE5	7F27	01030		FDB	CN
7FE7	7F36				
		01040		FDB	FD An
7FE9	7F44	01050		FDB	AO
7FEB	7F51	01060		FDB	DN
7FED	7F5F	01070		FDB	10
7FEF	7F6C	01080		FDB	FM
7FF1	7F7A	01090		FDB	NO
7FF3	7F88	01100		FDB	IE
7FF5	7FA0	01110		FDB	DS
7FF7	7FB2	01120		FDB	UF
7FF9	20	01130	ERRTXT	FCC	/ ERROR/
7FFF	00	01140		FCB	\$00
	7DF8	01150		END	START
00000	TOTAL ERRORS				



the

On Me,

by Gary Ritc<mark>hie</mark>

sa fast, colorful, Lo-Res action game for a 16K or 32K Extended Color Computer. It requires two joysticks for controlling play. Although written in BASIC, the program has a lot of fast action and is difficult to master.

The program is fairly simple and uses a lot of *REMs* to make it easy to debug. Also note that there is a high speed poke (*POKE* 65495,0)

in this game, so if your computer cannot use this poke, then you must make the change indicated in the last *REMs* in the program.

Instructions: You are a somewhat demented snake who has slithered onto a 30-lane freeway. The nearest exit is miles away, so you must slither down the highway as quickly as possible in order to escape. But horrors, it is rush hour, and there are hundreds of buses and trucks bearing

down on you! (This snake better have a lot of life insurance.)

At the beginning of the game, your snake is a single graphics block at the top of the screen. Using the right joystick to move back and forth, and the left joystick to control the speed (push forward to go faster), try to avoid the oncoming vehicles. If you don't hit anything, your snake will become longer and longer and will eventually reach the bottom of

the screen three times in order to win. Every time you crash, it will send you back up one block, and since this is a timed game, avoid those cars! Good luck!

The listing:

0

(Gary Ritchie, who is currently attending high school, has been programming the Color Computer for about a year. Upon finishing high school he plans to study for a career in the computer field.)

the RAINBOW

January 1984

173

40.....0129 140....040C 370....0661 530....08F2 700....0B17 END...0CFD

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If you're looking for the finest terminal software you can buy, look no further! And now we've added a high-res screen display that gives you 32 by 16, 42, 51, or 64 by 24 lines.* And you can switch between the high-res screen and the normal screen *without* destroying what you have in the buffer! + PLUS + we have a buffer editor, complete up and down load support, on-line cassette or disk reads and writes, off-line and on-line scrolling, pre-entry of data before calling, word wrap, buffer printing, selective printing, change any parameter so you can communicate with any other computer. You can send and receive Basic programs, ASCII file, as well as machine code, + PLUS + you can save your buffer to tape (Tape or Rom version) or disk (Disk version). You can communicate with the local BBS, CompuserveTM, The SourceTM, the main frame at work or school, other color computers, Apples, IBM PC's, TRS-80 Model I, II, III, IV, 12, 16, 100, or any other computer via RS-232.

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(32 Character Mode)

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COLOR KEY COMMAND

COLOR KEY COMMAND is a BASIC programming aid that will speed the entry of your programs. You can increase your programming speed by as much as 50%. Instead of having to type in all of the BASIC commands, you can simply press a control key, and then press one other key - the BASIC word is entered for you automatically! You can also activate the automatic line numbering mode, then every time you press enter a new line number is entered for you. You can select the start line and the increment. Ever wanted to copy lines you have already entered? Now you can. Simply type in the line number you want to copy, then type in the new line number. The new line is immediately displayed and you are put in Extended Basic's EDIT Mode. Either edit the line, or press ENTER. (This command is not available to those with non-extended Basic users.) How about merging programs together from tape? Those with Extended Basic do not even have to worry about proper line numbering, COLOR KEY COMMAND will RENUMBER each program as it is loaded into memory! COLOR KEY COMMAND also has four custom programmable keys! Each key is capable of holding 64 characters each! How would you like one button entry of 64 characters? What else will COLOR KEY COMMAND do? One button RUN, CLOAD, CLOADM, LLIST, LIST, RENUM, MOTORON, MOTOROFF, AUDIOON, AUDIOOFF, TRON, TROFF. Those with disk systems get one button BACKUP, DIR, FREE, and also you can print your directory to the printer with the touch of a button! You can turn off the program any time by pressing the CCMD OFF button. How can we offer so much for so little? We made templates that you can cut out yourself. You do about an hours work or less and save

about \$8.00. That is how much more we would have to charge if we did the work. You save in the process! You can also reprogram the prompt, no more "OK," and select the cursor color you want.

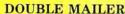
16K or 32K Required PRICE: \$18.95 (Tape)

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E DOS BASIC 364,000 BYTES!

That's right! Using your 64K Color Computer, and an 80 track drive, you too can have more than TWICE as much storage on your disk drive system. DOUBLE DOS BASIC allows you to use 35, 40 or 80 track (double or single sided) drives all on one system, all at the same time! Your system could consist of a 35 track drive, a two drive AMDEK system, and an 80 track drive, all working, and hooked up to your system! (The AMDEK drives are 40 track drives.) ALL commands are supported in DOUBLE DOS BASIC. The DOS is totally transparent to your BASIC programs! If your system selection is 80 tracks, a PRINT FREE command will return 158 granules! Compare this to the 68 granules your system now returns! The 40 track drives would return 78 granules, 10 more than the 35 track system. EVERY command in BASIC is supported by DOUBLE DOS BASIC. If you haven't already upgraded to 64K, now is the time! Use your system to its FULLEST! DOUBLE DOS BASIC also gives you RESET PROTECTION, unlike most of the other **64K** programs. **AND**, used with our ROM MOVE program, you can also get another 8000 bytes of BASIC addressable memory! DOUBLE DOS BASIC - \$24.95 DOUBLE DOS & ROM MOVE = \$29.95

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32K Required

PRICE: Tape \$19.95 Disk \$21.95

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16K or 32K Extended Basic Required

PRICE: \$14.95 (Tape)

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16K or 32K Extended Basic Required

PRICE: \$15.95 (Tape)

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16K or 32K Extended Basic Required

PRICE: \$19.95 (Tape)

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PRICE: \$19.95 (Tape)

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16K or 32K Extended Basic Required

PRICE: \$19.95 (Tape)

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32K Extended Basic Required

PRICE: \$12.95 (Tape)

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16K or 32K Required

PRICE: \$9.95 (Tape)

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16K or 32K Extended Basic required.

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```
10 POKE 65494.0
20 L=1025:R=1054:P=1039:M=0:HT=0
:Q=0:B8=70000:SC=0:FDR PP=1 TO 5
:READ PL:C(PP)=PL:NEXT PP
30 DATA 159,191,207,239,255
40 CLS RND(4)+1:PRINT@ 192.STRIN
G$ (32, "%"); :PRINT@224, STRING$ (13
, 255) ; : PRINT@237, "snaker"; STRING
$(13,255);STRING$(32,"%");
50 PLAY "T4 03 V25 L8 D G A L4 B
L8 A G P8 O4 D C# C O3 L4 B L8
A G PB D G B O4 L4 D L8 C# L4 D
03 L8 B A G L4... B L8 B 04 E D#
L4 E 03 L8 B L4 04 C L8 03 B 04
D C L4 03 B L8 A L4 G L8 B 04 D
C 03 B P8 A L4 G L8 A G F# E P8
B P4 O4 E" 'Bublitchki
60 PRINTE 480, "<<pre>press ANY key T
O START>>";: IF INKEY ="" THEN 60
70 '
80 'setup
90 GOSUB 840
100 CLS:FOR PP=1024 TO 1504 STEP
32: POKE PP, 175: PLAY"T255 04 A B
":POKE PP+31,175:PLAY"04 E":NEXT
PP: TIMER=0
110 '
120 'main loop
130 FOR QQ=1 TO 2:FOR N=148 TO 2
44 STEP 16
140 M=(JDYSTK(0)(6) - (JOYSTK(0)
>57)
150 SP=JOYSTK(3)
160 P=P+M: IF P<L THEN P=L ELSE I
F P>R THEN P=R
170 IF PEEK(P)<>96 THEN 320
180 POKE P,N
190 PLAY"02 T255 G 03 C"
200 FOR PP=1 TO SP:NEXT PP
210 POKE RND(30)+1504,C(RND(5))
220 POKE RND(30)+1504,C(RND(5))
230 POKE 1504,175: PRINT@ 511, CHR
$ (175) ;
240 NEXT N,QQ
250 '
260 'advance snake
270 L=L+32:R=R+32
280 IF L=1441 THEN POKE P,148:P=
P+32:POKE P,244:GOTO 380
290 POKE P,148:P=P+32:00T0 130
300 '
310 'crash
320 L=L-32:R=R-32:IF L<1025 THEN
L=1025:R=R+32
330 FOR PL=1 TO 2:PLAY"02 T2 L8
B":SCREENO, 1:PLAY"L8 E":SCREEN O
, O: NEXT PL
340 POKE RND(29)+1505,C(RND(5)):
POKE 1504,175:POKE 1535,175:POKE
```

P, 96:P=P-32:POKE P, 96:POKE P+1,

96:POKE P-1,96:IF P<1025 THEN P= P+32 350 GOTO 130 360 2 370 'reached bottom 380 HT=TIMER: Q=Q+1: IF Q=3 THEN 4 390 FOR PP=1 TO 15:PLAY"04 T255 A B E": POKE 1504, 175: PRINT@ 511, CHR\$(175);:NEXT PP:POKE 1504,175 :POKE 1535,175 400 L=1025:R=1054:P=1039:M=0:TIM ER=HT:GOTO 130 410 ' 420 'win 430 POKE 65494,0:CLS RND(8):PLAY "V7 02 T2 L8 F A 03 C L4 F L8 C L4. F": GOSUB 470 440 CLS RND(8):PLAY"V> 02 T2 L8 A 03 C E L4 G L8 E L4. G":GOSUB 470 450 CLS RND(8):PLAY"V> 03 T2 L8 C F A 04 L4 C 03 L8 A 04 L4. C": GOSUB 470 460 PLAY"V15":GOTO 510 470 PLAY"T255 01 E F G B C A E D AGFCEDCBGEADDABC GEADGCAEFEBCEDGA EDBCDEDGBCEDC" 480 RETURN

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500 'score

510 CLS RND(4)+1:PRINT@ 168,"YOU MADE IT IN: " :

520 SC=HT/60: Ms=LEFT\$ (STR\$ (INT (S C/60)),3):IF VAL (M\$)<1 THEN M\$=" 00"

530 IF LEN(Ms)>2 THEN Ms=RIGHTs(

540 S=LEFT\$(STR\$(INT(SC-INT(SC/ 60) *60)),3):IF LEN(8\$)<3 THEN 8\$ ="O" + RIGHT*(S*,1) ELSE S*=RIGH T\$ (S\$, 2)

550 FOR PP=1312 TO 1343:POKE PP, 33: NEXT PP

560 PS\$=M\$+":"+S\$:PRINT@ 301,PS\$

570 FOR 0=1 TO 5:FOR N=1 TO 12:P LAY"T255 0"+8TR\$ (0)+"N"+8TR\$ (N): NEXT N.O

580 FOR PP=1 TO 1800:NEXT PP 590 IF HT<BS THEN GOSUB 790 500°

610 'show best score

620 CLSO:PRINT® 10, "BEST SCORE"; 630 PRINT@ 224,STRING\$(32,143);: PRINT@ 192, STRING\$ (32, 255); PRIN

Te 256,8TRING\$(32,255); 640 PRINT@224, N\$; "----



Battle spiders! Blast your way through the descending blocks! Defeat the enemy tanks! Trap the menacing cycles! Increasing levels of difficulty make each a real challenge! KRON is a fast ML program with multi-colors, Hi-Res, and many great sounds. It displays the top five scores plus has a pause feature

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64K EXTENDED

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Copies tape based software (even most autostarts), displays memory in Hex and ASCII, displays the Start, End, and Exec addresses of ML programs, allows the changing of memory, and more (ML)! 16K STANDARD

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16K STANDARD

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650 FOR 0=5 TO 1 STEP -1:FOR N=1 2 TO 1 STEP -1:PLAY"T255 0"+STR\$ (D) +"N"+8TR\$(N): NEXT N.O 660 FOR PP=1 TO 1800: NEXT PP 670 680 'play again 690 SOUND 100,2 700 CLS: PRINT"ANOTHER GAME (Y/N) 710 Z*=INKEY*: IF Z*<>"" THEN 720 **ELSE 710** 720 IF ZS="N" THEN PRINT"BEST SC ORE: "; N\$: PRINT: PRINT BS\$: PRINT: G OTO 850 730 IF Z\$<>"Y" THEN SOUND 25,1:8 **0TO 700** 740 750 'reset and start 760 GOSUB 840:L=1025:R=1054:P=10 39:M=0:Q=0:SC=0:GOTO 100 770 ' 780 'new best score 790 BS=HT:HT=0:BS\$=PS\$:CLS RND(8):PRINT"WHAT IS YOUR NAME"::LINE INPUT">>>>?"; N\$ 800 RETURN 810 ° 820 'high speed 830 'IF YOUR COMPUTER CANNOT TAKE THE HIGH SPEED POKE. THEN CHANGE THE FOLLOWING LINE TO: 840 RETURN 840 POKE 65495, 0: RETURN

Hint . . .

850 END

Single Disk *COPY*

Here's a feature which can be invaluable for users with a single disk drive. The Radio Shack Disk Manual mentions that use of the COPY Command requires two or more drives. This is not necessarily true. A single drive COPY can be made by doing the following:

1) Insert disk with file to be copied into the drive 0.

- 2) Type "COPY "FILENAME/ext:0" and press <ENTER>.
- 3) There will be one short beep and a notice will appear on the screen instructing the user to insert the destination disk.
- 4) Insert destination disk and press <ENTER>.
- 5) Once completed there will be two copies of the program: one original and one on the destination disk.

This method works for all types of disk files including machine language programs.

Monitor Mod For Your CoCo

By Richard Kottke

Then was the last time you had to interrupt your word processing because your wife was busy food processing? Has your neighbor's electric garage door opener closed your CoCo? Do electric shavers, hair dryers and toasters make your TV picture do the hula? If so, then you are suffering from the television picture blues. There are many causes; line interference, bad cables, rotten old TV's, but only one good cure: buy a video monitor.

Costing approximately \$300, video monitors are quite competitive with their television cousins, with one catch: CoCo was intended for televisions only. In other words, if you ran a cable from the "TO TV" jack on your computer to a video monitor, all you'd get would be a blank screen. How depressing! Will CoCo be forever deprived of the high quality, razor-sharp picture of a video monitor? Will we all be condemned for life to staring at blurry, interferenceladen, rotten, gosh-awful televisions while using one of the world's best computers? No! Something must be done!

Well, if you're the adventurous sort, you can have that high-quality, razor-sharp monitor working on your CoCo for the price of some solder and a few feet of cable, with the added bonus of a professional quality sound output. How? Perhaps a little theory will illustrate. Video monitors and televisions are actually pretty much the same-with one exception: televisions get their picture from a radio frequency (R.F.) signal, and monitors use a voltage frequency

(Richard Kottke, a native of Crivitz, WI, is a student at the University of Wisconsin-Madison under a Naval ROTC scholarship. He is majoring in electrical engineering.)

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(I.F.) signal. Some computers, such as the Apple, were designed to be used with monitors, so their video output is an I.F. signal. To be used with a TV, the Apple's I.F. video signal must be run through an R.F. modulator, which is then hooked up to a standard TV set. Aha! The signal we want, then, must be an unmodulated signal, one that has not been run through an R.F. modulator.

As it turns out, CoCo has an R.F. modulator built into the circuit board. To use a monitor with our CoCo, we must intercept the video signal before it gets to the R.F. modulator, while it is still in the I.F. form. At this point, you might as well open up your computer so you can see what I'm talking about.

Turn the computer upside-down and look at the bottom. There are nine medium-sized holes in the case. Get a medium-sized Phillips screwdriver and try to unscrew a screw from each hole (some holes may not have screws-it depends on what revision board you have). The last screw is under the sticker that says "breaking this seal will void your warranty . . . "If you want to be sneaky, you can peel it off and glue it back on later. Once all of the screws are out, turn the computer right side up and remove the case top. Behold the naked CoCo! Touch not any chip, lest it mysteriously zonks out! Turn the case so that you are looking at the back of the computer. You shouldn't notice (see Figure 1) the R.F. modulator in front of you. One of the four leads going into this magic box contains that elusive I.F. signal, which is what we want. Another one carries the sound signal, which we must also tap, because the monitor's I.F. signal does not carry sound.

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Now, on with the mod. Get the following:

- 1. A video monitor, preferably one with a built-in audio amp;
- 2. Two shielded cables with "RCA" plugs (RS #42-2, #42-2371;
- 3. Some shielded solder;
- 4. A low watt soldering iron; and
- 5. Some patience and a steady hand.

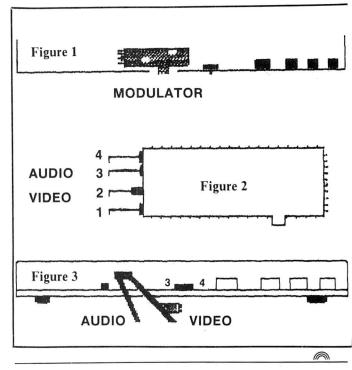
First burn, cut, file, or drill a hole in the back of the upper case large enough for the two cables, then thread the cables through the hole. Now look at Figure 2. Solder the center lead from one of the cables to lead #1 from the modulator (this is the I.F. video). Solder the center lead from the other cable to lead #3 from the modulator (this is the sound). Twist the copper shielding from both cables together, and solder it to the case of the modulator. Lastly, mark the video cable (from lead #1) with a piece of tape. Now carefully replace the case top, turn the computer over, and replace the screws (the two small ones go up near the keyboard). If you did everything correctly, the back should look like Figure 3.

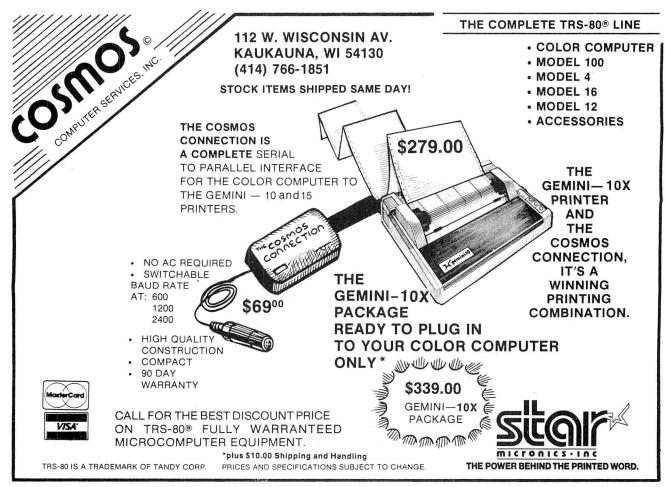
To test the mod, plug the cable with the tape into the jack of your video monitor labled "VIDEO IN." Plug the unmarked cable into the jack marked "AUDIO IN," or plug it into your stereo system. When you turn everything on, the video monitor should show the familiar green screen with a black border.

You will probably have to fiddle with the controls a bit to get a really good picture. If, no matter how much you fiddle, the picture looks washed out, reopen the computer and, while it is running, adjust the pot labeled "contrast" on the circuitboard. If you can't find the pot, it should be near the modulator. R pot is a sort of black, disk-like deal with an

inset shaft that turns. Adjust this pot until you like what you see, and then reclose the case.

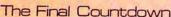
I've had this mod installed for a month now with no problems, except that I had to readjust the contrast pot when switching from TV to monitor. Nothing I've seen can beat that clean, crisp video picture, and it sure cures those old television blues!





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(by Bill Cook)

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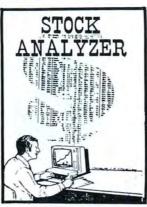
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- iership role can benetit from these programs.

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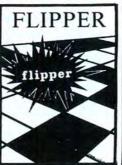


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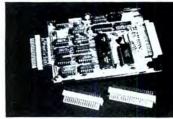


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FEATURES

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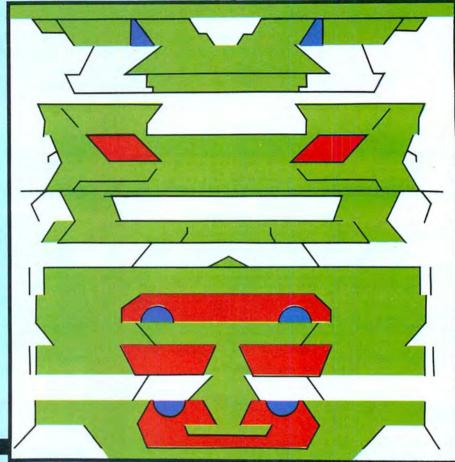


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Puzzle Sticks and Picture Maker



By Stephen Lai

illions of people have undertaken the rewarding, yet patience-testing challenge of jigsaw puzzles. Puzzle Sticks (Program Listing 1) is an entertaining game that requires you to rearrange pieces that consist of thin horizontal sticks, instead of the ordinary, irregularly-shaped pieces.

Puzzle Sticks offers a wide range of pictures and difficulties. There are five preprogrammed pictures. The sixth one, Your Own Creation, lets you retrieve pictures from cassette. Picture Maker (Program Listing 2) provides simple commands for you to create original pictures and save them to cassette.

You may select either 17 or 34 sticks. Seventeen sticks are wider and much easier to solve than 34 sticks. The sticks are randomly shuffled an amount of switches that you specify.

The sticks are rearranged by exchanging two sticks at a time. Move the red and green pointers to the two sticks that you wish to be switched and press [ENTER]. The sticks trade positions using the *GET/PUT* statements in lines 310 and 320. The red pointer is moved up and down with the up arrow and down arrow keys. The green pointer is moved with the right arrow and [CLEAR] keys. A pointer may be moved from the top stick to the bottom stick by ordering it up, and vice versa.

(Stephen Lai is a high school freshman in Palatine, Ill. He has enjoyed programming the CoCo for three years.)

The blue number represents the number of switches that have been made. The red pointer represents the number of random computer shuffles that you specified.

The first three pictures, Mr. Grouch, Happy Face, and Buggy, are suitable for younger children when 17 sticks are chosen. The next two pictures, Bouncing Boxes and Spiraling Lines, are much more difficult, especially when 34 sticks are chosen.

Picture Maker lets you create pictures for Puzzle Sticks. In Puzzle Sticks the picture didn't take up the whole screen. Because of this, the cursor used in Picture Maker is limited to that same area. There are basically two types of commands, primary and secondary. The four letters in the upper-left of the screen indicate which primary command has been called. The secondary commands are to be used only when a primary command is in use. In other words, the secondary commands can only be used when one of the four graphic letters are blue.

Secondary commands.

1-4) These four number commands set the color of the primary graphics command. The box in the lower-left of the screen shows the current color. Next, are the eight keys surrounding the S key. These keys move the cursor two pixels in the direction that they are related to the S key. For example, W would move the cursor two pixels up and C would move the cursor two pixels down and to the right.

The eight keys surrounding the K key move the cursor five pixels in the direction that they are related to the K key.

Primary commands

5) The numeral 5 allows you to produce circles. The C on the graphics screen will turn blue when this command is in use. First move the cursor to the location of the circle's radius and press [ENTER]. Then move the cursor to a point on the circle's circumference and press [ENTER]. The circle will then be drawn. Don't worry if part of the circle extends beyond the picture's boundaries.

6) The numeral '6' allows you to draw using the 16 secondary cursor-moving commands. The D on the graphics screen will turn blue when this command is in use. To escape from this command, press R. I have found this command to

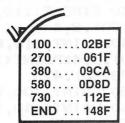
be the most useful.

7) The 7 allows you to draw single lines. The L on the graphics screen will turn blue when this command is in use. Move the cursor to one end of the desired line and press [ENTER]. Then move the cursor to the other end of the line and press [ENTER]. A line will be drawn from one end to the other.

8) This command allows you to print inside a one-colored border. The border has to be totally enclosed, or else the paint color will leak out and make a mess. The P on the graphics screen will turn blue when this command is in use. This command requires three steps. First, set the box in the lower left of the screen to the paint color and press [ENTER]. Then do the same thing for the border color. Lastly, move the cursor to a location inside the border and press [ENTER]. The bordered area will then be painted.

9) The 9 allows you to save the screen to tape. All unneeded bordering graphics will be cleared away. The picture's name is asked for. Type it in and press [ENTER]. Then position the tape and press [ENTER]. Lastly, press "play" and "record" on the tape recorder and hit [ENTER].

One important thing to remember when producing the pictures is to make sure that no two horizontal sticks are identical. This causes a mixup when the picture appears to be unscrambled while playing *Puzzle Sticks*, but two identical sticks are actually in each other's position.



Listing 1:

1 ' PUZZLE STICKS
2 ' BY STEPHEN LAI
3 ' (C) 1983
10 PMODE3:F=RND(-TIMER):DIMO(34)
,S1(60),S2(60),BX(4),BY(4):FORF=
1TO34: O(F) =F: NEXT: CLS: INPUT"DO Y
OU NEED INSTRUCTIONS (Y/N)"; QU\$:
IFQU\$="Y"THENGOSUB720
20 CLS: INPUT"34 OR 17 STICKS"; ST
:IFST<>34ANDST<>17THEN20ELSEIFST
=34THENIN=5:P=8ELSEIN=10:P=5
30 INPUT"NUMBER OF SHUFFLES"; SH:
IFSH<1THEN30
40 GOSUB150
50 DATARADALAUABD10, BDR2NUD5NL2R
28I 48D4 NDR4D3I 4D3R4IIBI 48D5 NDR4

D3NL2D3L4NUBD4, D3R4ND3U3BD10BL4 60 DATANR4D3R4D3L4NUR4BU5UBD10BL 4.NR4D3NR4D3R4U3BU2UBD10BL4,BD6E 4U2NL4BD10BL4, NR4D3NR4D3R4U6BL4B D10, NR4D3R4D3L4NUR4U6BD10BL4 70 FORF=OTO9: READNU\$ (F): NEXT 80 DRAW"S8BM4, 6C3"+NU\$ (0) +NU\$ (0) +NU\$ (0) 90 COLOR4 100 D1=INT(SH/100):D2=INT((SH-D1 *100)/10):D3=SH-D1*100-D2*10:DRA W"BM4, 120"+NU\$ (D1) +NU\$ (D2) +NU\$ (D 3) 110 FORF=OTO8STEP4:LINE(40-F.9-F)-(246+F, 180+F), PSET, B: NEXTF 120 COLOR2:LINE(32,10)-(40,180), PSET, BF: COLOR4: LINE (32, 9) - (40, 9) , PSET: LINE (32, 180) - (40, 180) , PSET 130 COLOR3: FORF=10T0180STEPIN:LI NE(28, F) - (32, F), PSET: NEXT 140 GOT0170 150 TT=0:CLS:PRINT:PRINT"PICTURE S: ": PRINT: PRINT" 1) MR. GROUCH": PRINT" 2) HAPPY FACE": PRINT" 3) BUGGY": PRINT" 4) BOUNCING BOXES" :PRINT" 5) SPIRALING LINES":PRIN T" 6) YOUR OWN CREATION": PRINT: I NPUTA: IFA>6 THEN150ELSEPCLS2 160 ON A GOSUB340,510,590,430,65 0,840: RETURN 170 FORF=1TOSH 180 A=RND(ST):B=RND(ST):F3=O(A): O(A) = O(B) : O(B) = F3190 A=10+(A-1)*IN:B=10+(B-1)*IN: GET (36, A) - (244, A+IN-1), S1: GET (36 ,B)-(244,B+IN-1),S2200 PUT (36,A) - (244,A+IN-1),S2:PU T(36,B)-(244,B+IN-1),S1210 NEXT: SCREEN1, 0 220 F1=5:F2=10:E1=5:E2=10 230 COLOR2:LINE(25,E1*IN+P)-(30, E1*IN+P-1), PSET, B:LINE(25, E2*IN+ P)-(30,E2*IN+P-1),PSET,B 240 E1=F1:E2=F2 250 COLOR4:LINE(25,F1*IN+P)-(30, F1*IN+P-1), PSET, B 260 LINE(25,F2*IN+P)-(30,F2*IN+P -1), PRESET, B 270 A\$=INKEY\$:IFA\$="^"THENF1=F1-1ELSEIFA\$=CHR\$(10)THENF1=F1+1ELS EIFA\$=CHR\$(9)THENF2=F2-1ELSEIFA\$ =CHR\$(12)THENF2=F2+1ELSEIFA\$=CHR \$(13) THEN310 280 IFF1>ST THENF1=1ELSEIFF1<1 T HENF1=ST 290 IFF2>ST THENF2=1ELSEIFF2<1 T HENF2=ST 300 GOTO230 310 TT=TT+1:D1=INT(TT/100):D2=IN T((TT-D1*100)/10):D3=TT-D2*10-D1

380 CIRCLE(148,100),30,4,.8,.86, *100:COLOR2:LINE(0,0)-(20,90),PS ET, BF: DRAW"S8BM4, 6C3"+NU\$ (D1)+NU . 65 390 DRAW"C3; BM42, 10; B; M+11, 30; E3 \$(D2)+NU\$(D3):G1=10+(F1-1)*IN:G2 ;R1;E1;R9;F1;R1;F3;L2;H1;L1;H1;L =10+(F2-1)*IN:GET(36,G1)-(244,G1 +IN-1),S1:GET(36,G2)-(244,G2+IN-8; G1; L1; G1; L3; C4 400 PAINT(140,146),4,3 1),52 320 PUT (36,G1) - (244,G1+IN-1),S2: 410 DRAW"BM42, 10; B; M+9, B; F1; R5; M PUT (36,G2) - (244,G2+IN-1),S1:PLAY +2.1;B;R9;M+2,-1;R5;E1" "T255L2504CDEFGABGEC" 420 RETURN 330 G3=0(F1):0(F1)=0(F2):0(F2)=G 430 X=RND(205):Y=RND(168):SX=RND 3:FORF=1TOST:IFO(F)=F THENNEXT:G (5)+5:SY=RND(5)+4:C=1 440 FORF=1T020: X=X+SX: Y=Y+SY: C=C OT0700: ELSEGOT0230 340 DRAW"C4; BM42, 10; S20; B; R6; N; R +1: IFC=5THENC=1ELSEIFC=2THENC=3 27;G1;D1;G1;D3;R1;E1;R3;F1;R1;E1 450 COLORC ;R2;F2;E1;R1;E2;F2;R2;E2;F2;R1;E 460 IFX>205THENX=205:SX=-SX:ELSE 2;F2;R2;E2;U1;H3;L1;B;M+3,5;D2;F IFX<OTHENX=O:SX=-SX 1;D2;F1;D1;N;D1;R1;F1;D7;G1;L2;U 470 IFY>168THENY=168:SY=-SY:ELSE 7; N; E1; D10; G1; D2; G1; D1; G1; D1; G1; IFY<OTHENY=O:SY=-SY D1;L25;U1;H1;U1;H1;U1;H1;U2;H1;U 480 LINE (36+X, 10+Y) - (36+(205-X), 3; N; U7; L2; H1; U7; E1; R1; D1; N; F1 10+(170-Y)), PSET, B 350 DRAW"U2;E1;U2;E1;U1":PAINT(1 490 NEXT 500 RETURN 50,15),1,4 360 DRAW"BM42,10;B;M+7,12;D2;F2; 510 DRAW"C3; BM42, 10; S20; B; R11; N; R5; E3; U1; H2; L1; L5; G2; B; R4; D1; R2; M-9, +10; R14; M+8, 5; M+3, 5; M-18, -9; U1;H1;G1;D1":PAINT(102,70),3,4:P M-16, +9; D3; G1; D6; F1; R2; U2; H1; U4; AINT (95, 65), 4, 4 H1; B; M+2, 8; F2; N; M+6, 10; M-6, +5; M+ 370 DRAW"B;R18;U1;R2;D1;G1;H1;U1 6,5;R26;M+8,-5;M-9,-4;N;M-5,+9;M ;B;U2;R4;F2;D2;G2;L4;H3;U1;E2;R2 +3, -4; R2; N; E1; L2; U2; E1; U4; E1; F1; ":PAINT(190,75),3,4:PAINT(185,72 N; D6; H1; U2"),4,4 520 DRAW"B;M-5,+2;U1;H2;L5;H2;U1 ;B;L5;D1;G2;L5;G2;D1;B;F7;D1;F1; R1;F1;R3;E1;R1;E1;U1;H1;L1;H1;L3 ;G1;L1;G1;B;H3;L2;H1;U1;E2;R1;E1 Chattanooga Choo Choo Software ;R2;F3;G2;L4;B;R17;L6;H2;E3;R2;F We Pay Postage Your One Stop Station 1;R1;F2;D1;G1;B;D3;M-7,+6;L5;M-8 ,-6;M+6,10;R9;M+5,-10" For Computer Programs 530 CIRCLE(110,80),8,4:CIRCLE(16 Track 29 8,80),8,4 540 PAINT(110,80),3,4:PAINT(168, 80),3,4:PAINT(100,80),4,3:PAINT(Buy 1 Program Get 10% Off Buy 2 or More Programs Get 15% Off Except Prickly-Pear Software (15% Off As Shown) VISA 178,80),4,3 **Mark Data Products** 550 PAINT(100,50),1,3 *Glaxxons, *Bumpers,
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the RAINBOW January 1984

630 PAINT(120,95),1,1:PAINT(152, 95),1,1

640 RETURN

650 PI=3.1415926:F=RND(4):IFF=2T HEN650ELSECOLORF:R1=40:R2=85:IA= RND (20) +30

660 FORF=-PI TOPI STEPPI/20:R1=R 1+1:X1=SIN(F)*R1:Y1=COS(F)*R1:X2 =SIN(F-PI-IA)*R2:Y2=COS(F-PI-IA) *R2

670 LINE(X1+140,Y1+95)-(X2+140,Y 2+95).PSET

680 NEXT

690 RETURN

700 PLAY"T15L1505A04A03A02A01FCD EFGABO2CDEFGABO3CDEFGABO4CDEFGAB O5CDEFGAB"

710 A\$=INKEY\$: IFA\$=""THEN710ELSE RUN

720 CLS:PRINT"----INSTRUCT IONS----"; : PRINT: PRINT"

IN THIS GAME, A PICTURE OSEN BY YOU) WILL BE SHUF-FLE D UP INTO HORIZONTAL STICKS. R GOAL IS TO REARRANGE THEM THAT THEY ARE ALL IN CORRECT ORD

730 GOSUB820

740 CLS:PRINT:PRINT" YOU CAN CHOOSE BETWEEN TWO DIFFERENT ST IF YOU ICK AMOUNTS, 34 OR 17. CHOOSE 34, THE STICKS WILL BE THINNER. ": PRINT: PRINT" MOVE THE STICKS, MOVE THERED AND GREEN POINTERS UP AND DOWN TO TWO STICK LOCATIONS AND "; THE TW 750 PRINT"PRESS (ENTER). WILL AUTOMATICALLY SWI O STICKS TCH POSI- TIONS."

760 GOSUB820

TO MOVE THE RE 770 CLS:PRINT" D POINTER. USETHE UP AND DOWN AR ROW KEYS. ": PRINT" TO MOVE THE GREEN POINTER, USE THE RIGHT A KEYS. ": PRINT: PR RROW AND CLEAR INT" THE BLUE NUMBER REPRESEN THE NUMBER OF SWITCHES MADE TS AND ";

780 PRINT"THE RED NUMBER REPRESE NUMBER OF COMPUTER SHU NTS THE

790 PRINT:PRINT" AFTER YOU HA VE COMPLETED THEPUZZLE, PRESS AN Y KEY TO PLAY A-GAIN."

800 GOSUB820

810 RETURN

820 PRINT@490, "HIT ANY KEY";

830 IFINKEY\$=""THEN830ELSERETURN 840 CLS:PRINT"WHAT IS THE PICTUR

E'S NAME": INPUTNAS: PRINT: PRINTNA

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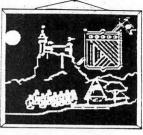
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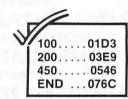
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\$" IS NOW BEING LOADED...":CLOAD MNA\$:PRINT:PRINT" LOADING COMP LETE. ": FORF=1T0460: NEXT: RETURN 850 RETURN



Listing 2:

PICTURE MAKER

STEPHEN LAI 2 ' 3 ? (C) 1983

10 X=50: Y=50: C=4

20 PMODE3,1:PCLS2:SCREEN1,0

30 FORF=10T0180STEP5:LINE(28,F)-(32.F).PSET:NEXT

40 LINE (34,9)-(246,179), PRESET, B :LINE(2,150)-(24,180), PRESET, BF:

LINE (6, 154) - (20, 176), PSET, BF 50 C\$="BM10,10;N;R10;D15;R10":D\$

="BM10.30; R6; F4; D7; G4; L6; U15": L\$ ="BM10,50;D15;R10":P\$="BM10,70;R 6; F4; D2; G4; L6; N; U10; D10"

60 DRAWC\$: DRAWD\$: DRAWL\$: DRAWP\$

70 As=INKEYs: IFAs<"5"ORAs>"9"THE N70

80 A=VAL (A\$)

90 DN A-4 GOTO230,330,440,540,66

0 100 P1=PPOINT(X,Y):P2=PPOINT(X,Y -1)110 A\$=INKEY\$:PSET(X,Y,5-P1):PSE T(X, Y-1, P2)120 PSET(X,Y,P1):PSET(X,Y-1,P2) 130 IFA\$=""THEN110 140 IFA\$<"5"ANDA\$>"O"THENC=VAL(A \$):COLORC:LINE(6,154)-(20,176),P SET, BF 150 IFA = "Q"THENX = X - 2: Y = Y - 2ELSEI FA\$="A"THENX=X-2ELSEIFA\$="Z"THEN X=X-2:Y=Y+2ELSEIFA\$="X"THENY=Y+2 ELSEIFA\$="C"THENX=X+2:Y=Y+2ELSEI FA\$="D"THENX=X+2ELSEIFA\$="E"THEN X=X+2:Y=Y-2ELSEIFA\$="W"THENY=Y-2 160 IFA\$="U"THENX=X-5:Y=Y-5ELSEI FAS="J"THENX=X-5ELSEIFAS="M"THEN X=X-5:Y=Y+5ELSEIFA\$=","THENY=Y+5 ELSEIFA\$="."THENX=X+5:Y=Y+5ELSEI FA\$="L"THENX=X+5ELSEIFA\$="O"THEN X=X+5: Y=Y-5ELSEIFA\$="I"THENY=Y-5 170 IFX<36THENX=36ELSEIFX>244THE NX = 244180 IFY<10THENY=10ELSEIFY>178THE NY=178 190 IFA\$="R"ANDA=6THEN420 200 IFA=50RA>6THENIFA\$=CHR\$(13)T HENSOUND100, 2: RETURN

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210 IFA=6THENRETURN 220 GOT0100 230 DRAW"C3"+C\$ 240 GOSUB100 250 X1=X:Y1=Y 260 PSET(X,Y,C2) 270 GDSUB100 280 X2=X:Y2=Y 290 SOUND200,2 300 R=SQR((X2-X1)^2+(Y2-Y1)^2):C IRCLE(X1, Y1), R, C 310 DRAW"C4"+C\$ 320 GOTO70 330 DRAW"C3"+D\$ 340 LINE(X,Y)-(X,Y),PSET 350 X1=X:Y1=Y 360 GDSUB100 370 X2=X:Y2=Y 380 COLORC 390 LINE(X1,Y1)-(X2,Y2),PSET 400 X1=X2:Y1=Y2 410 GOTO360 420 DRAW"C4"+D\$:SOUND50,2 430 G0T070 440 DRAW"C3"+L\$ 450 GOSUB100 460 X1=X:Y1=Y 470 PSET(X,Y,C2) 480 GOSUB100 490 COLORC 500 LINE(X,Y)-(X1,Y1),PSET 510 SOUND220,2 520 DRAW"C4"+L\$ 530 GOTO70 540 DRAW"C3"+P\$ 550 GOSUB100 560 CP=C 570 GOSUB100 580 CB=C 590 GOSUB100 600 COLORCB:LINE(34,9)-(246,179) , PSET, B 610 PAINT(X,Y),CP,CB 620 LINE(34,9)-(246,179), PRESET, 630 SOUND25,2 640 DRAW"C4"+P\$ 650 GOT070 660 COLOR2:LINE(0,0)-(256,9),PSE T, BF:LINE(0,0)-(34,192), PSET, BF: LINE (256, 192) - (246, 0), PSET, BF: LI NE (256, 192) - (0, 179), PSET, BF 670 CLS:PRINT"WHAT IS THIS PICTU

RE'S NAME": INPUTNAS: PRINT: PRINT"

PRESS <ENTER>.";:LINEINPUTX\$:LIN

TAPE RECORDER AND PRESS <

EINPUT"PRESS PLAY AND RECORD ON

ENTER>"; A\$: CSAVEMNA\$, 1536, 7679, 0

POSITION THE TAPE AND

GRAPHICS

32K DISK ECB



ΠR^2 ?

No, Pie Are Round

By Dave Clements

ple graph is a menu-driven BASIC program that plots a ple graph on the *PMODE 4* screen. The program is designed for a 32K disk system and a C. Itoh (Prowriter) printer. It is a little over 8K in length, is small enough to fit into a 16K system, and can be easily modified to work with a cassette, with or without a printer.

The program's salient features include:

1) Three methods of data entry, all menu-driven.

Option to save input data or plotted graph to disk (or tape with appropriate program changes).

3) Prints title and/or subtitle and input category labels on the display. The titles are automatically centered at the top of the display and the main title can be enlarged to double-

sized print.

 Option to include amounts and computed percentages on the display.

5) Option to highlight any pie section.

6) Option of print and screen backgrounds (dark print on

light background or vice versa).

The input routines available are Manual, Auto, and Saved Graph. The Manual mode is menu-driven and allows you to input up to nine categories or labels and an associated

(Dave Clements has a master's degree in electronics engineering and is a commander in U.S. Coast Guard. He is presently chief of the Coast Guard's Loran-C Navigation Branch for the U.S. West Coast and Pacific Ocean areas. He and his family live in Novato, Calif.)

value or amount. For instance, following the data entry screen prompts, you could key in FOOD, 320.00, UTILITY, 125.00, SAVINGS, 250.00, RENT, 465.00, etc. Each category label is suppressed to the left eight characters and each amount to six digits (including decimal) for screen printing. Data entry is completed by simply pressing "Q" and/or [ENTER] anytime after the second label prompt. After the ninth entry, the program will automatically exit the data entry mode. Data correction and re-entry can be completed simply by answering the DATA OK (Y/N)? prompt with an "N." All prompt responses use an INKEY\$ subroutine so an [ENTER] is not required. The entered data can be saved if desired. If data is saved, it can be recalled by selecting the Auto data entry from the input menu. The Saved Graph routine allows you to recall a graph that was previously drawn and saved.

After data has been entered and verified or saved, the program will query you about title size. After responding, you will be asked to enter a title and subtitle (only uppercase letters, numbers, %, /, and = are supported by the DRAW strings), and whether you want the amount and computed percentage to be included on the plot. The title and subtitle can be eliminated simply by pressing [ENTER] in response to these prompts. After all prompts are answered, sit back and watch the titles, labels, and graph being drawn on the Hi-Res screen.

The pie sections are drawn in the same order as entered with the first sector labeled "1." The remaining sectors are in clockwise order. If you desire to have all sectors labeled; ie, 1, 2, 3, 4, etc., simply delete Line 1300. Due to the design of



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Seminar Program And Speakers

Don Inman

Using And Teaching LOGO

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Phil Kitchen Radio Shack Software Support Manager of Software Support for Radio Shack, Phil will explain how the Tandy third party software support program works and answer questions about how Radio Shack can be of assistance to authors.

Paul Searby

Software Theft

Martin Goodman

A panel discussion of one of the most important issues in the CoCo field with Mr. Searby of Computerware and Dr. Goodman of Cheshire Cat Software.

Linda Nielsen

Women's Programs

Linda, of Moreton Bay Laboratory, and several others active in the CoCo area, will lead a discussion on women's involvement in computing in general and the Color Computer in particular. Theme of the program: It's Not A Man's World.

For women and men who view computers mainly as an annoyance, a special seminar is planned on the general topic How To Live With A Computer At Home.

Bill Nolan

Fantasy Gaming And CoCo

DungeonMaster, programmer and Rainbow Columnist, Bill has developed a complete Dungeons and Dragons program for CoCo.

Tom Nelson Start Your Own Software Business Tom is a Rainbow columnist and one of the owners of Nelson Software Systems.

The Dragons of Menlo Park

Open Forum

Members of the Dymax group—including Bob Albrecht, Don and Kurt Inman—and a host of others—will conduct a "laidback California" open discussion on software and book authorship.

Jim Reed

Writing For Rainbow

Jim, Managing Editor of the Rainbow, will talk about how you can submit programs and articles to magazines for fun and profit.

AND: A special session on assembly language programming . . . and more to be announced later.

PLUS . . . RAINBOWfest's "CoCo Community" Breakfast featuring Bob Albrecht, Popular Author and *RAINBOW* columnist

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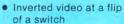
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REDWOOD GOLF

by David C Langue

@ JARB softwar

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the characters you may have to change the radius value in the CIRCLE command in Line 1310 as this determines the starting screen position for each execution of the DRAW routine. Values between 50 and 60 will place the number inside the pie, whereas numbers greater than 78 will place them outside. Both locations create minor problems. "Inside" numbers could be erased by the highlighting option or conflict with the sector plot on small sectors. "Outside" numbers may conflict with the labels or be near the edge, or off, the screen.

After the graph is completed it will remain displayed until any key (except the [BREAK], [CLEAR], or [SHIFT]) is depressed. After depressing any key, you will be asked to respond to another series of options. These include highlighting sections of the pie, saving the graph, and printing a hard copy on your printer. The screen print program I use, GSPRP, is an excellent one from Custom Software Engineering, Inc. that permits several options such as copy size and position on the paper. If you answer "Y" to the "WANT HARD COPY (Y/N)?" prompt you will be presented with questions peculiar to the GSPRP program.

When the hard copy is completed, or after you answer "N" to the prompt, "FINISHED?" will appear on the text screen. A "Y" response will clear the screen and return the OK prompt and flashing cursor. An "N" response will display a reverse print and background question. Another "N" simply returns to the Data Input Menu, whereas a "Y" to this question will change future screen displays before returning

you to the Data Input Menu.

The program contains limited error trapping. All file names are suppressed to eight characters; pressing "Q" after entering the "Auto" data entry, "Save Data" or "Save Graph" routines will return you to the Data Entry Menu or to the next line in the program (as if you did not select that particular option). Program layout is shown below.

Program Summary

Lines 1-7	Program credits
Lines 10-70	Opening logo, load ML screen
	dump, and DIMension
Line 40	Hi-Res text drawing routine
Lines 100-120	Auto data input
Line 168	Saved graph input
Lines 190-200	Print and background selection
Lines 210-370	Menu and Data input
Lines 400-500	Pie graph plot routine
Lines 570-990	DRAW strings for letters, num-
	bers and special characters
Lines 1040-1120	Screen format prompts; title,
	subtitle and label printing
Lines 1150-1230	Prompts for screen labels,
	amounts, and percentages
Lines 1260-1340	Locates center of pie slices for
	highlighting routine
Lines 1370-1460	Selection and painting of high-
	lighted sectors
Lines 1490-1510	Data save routine
Line 1540	Graph save routine
Lines 1570-1680	Printer copy routines
Line 1690	PCLEAR
Line 1700	Data for opening logo border

Program changes to accommodate systems configured differently are described in the following paragraphs.

If you do not have a C. Itoh printer, Lines 50, 520, and

Lines 1570-1680 must be deleted or changed to accommodate your printer and screen print routine. If these lines are deleted, you must also change *GOTO50* to *GOTO60* in Line 30.

For a 16K system, change & H7 in Lines 10, 50, and 1640 to &H3 (or to memory locations for your particular screen print routine requirements). To conserve space, all lines that do not end in 5 or 0 can also be deleted.

For a cassette system change:

Lines 50, 160, 1610	LOADM to CLOADM
Lines 110, 1490	#1 to #-1
Lines 120, 1510	#1 to #-1 and add #-1 after
	CLOSE
Lines 1500:	WRITE#1 to PRINT#-1
Lines 1540:	SAVEM to CSAVEM

If you have the screen dump program GSPRP and cassette system, there is one instance where you would have to reload GSPRP. This occurs if you have printed a full-page (double-sized) hard copy then want a regular-sized print. When you do this, GSPRP is reloaded in Line 1610; therefore, your tape must be repositioned. Appropriate prompts should also be placed in the above lines to remind you to position the tape, press play and record, etc. I'll leave these to your preference.

Drawing speed on the high resolution screen has been increased by the *POKE* 65495,0 command. If your system cannot operate in the fast mode then *POKEs* should be removed from Lines 410, 1090, and 1390.

For those of you who want a copy of *Piegraph* and don't get *Rainbow On Tape* or don't want to key in the program, send me \$5 and I will send a copy on disk (or tape if requested), less the screen print machine language program.

I've enjoyed developing this program. It should be errorfree, but if you have any problems or want to suggest improvements please contact me. Please feel free to experiment and modify the program for your specific needs.

1/2			
V	40 01CE	1038	0F40
	200 0451	1148	11BE
	39806B2	1369	141D
	569 08 F 5	1540	169C
	7700C24	END	196C

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- Display disk directory (disk only)
- Display Free disk space available
- Software remembers last file name Saved or Loaded and will write to that file by default if desired
- Dynamic margin changes within text
- Select Top margin, Bottom margin, and Page length
- Choose number of duplicate copies
- Page Pause, for single sheet users, if desired
- Optional page numbering begins with any selected page number
- Printer Font codes are user definable
- All printer format options may be changed dynamically within text
- Any string of HEX characters may be imbedded within text to send any special control codes to your printer
- An Eject (top of form) command may be inserted within text
- Variable Text Merge symbols may be inserted anywhere within text
- All machine language; 32K and Extended Basic required for ROMcall routines

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40 FOR X1=1TO LEN(X\$):Y1=ASC(MID \$(X\$,X1,1))-32:DRAW"XL\$(Y1);":NE XT: RETURN

50 LOADM"GSPRP": DEFUSR1=&H7D90: D EFUSR2=&H7D92

60 GOTO1690

70 DIML#(60),F(10),A(10),B(10),P (10),PT(10):CC=0:GOT0570

98 '

99 ' INPUT PREVIOUS SAVED DATA 100 CLS: INPUT"DATA FILE NAME"; NF \$: IFNF = "Q"THEN210 ELSE NF = LEFT \$ (NF\$,8)

110 OPEN"I", #1, NF\$: INPUT#1, I, SUM

120 FOR KK=1TO I-1: INPUT#1,F\$(KK) .F(KK): NEXT: CLOSE

130 GOTO340

158 '

159 'INPUT SAVED GRAPH

160 CLS: INPUT "GRAPH NAME" FIS: IF FI = "Q"THEN210 ELSE FI = LEFT = (FI *.8):LOADMFI *: SCREEN1.0: GOSUB20: G0T0520

188 '

189 ' SCREEN BACKGROUND SELECTIO N

190 CLS:PRINT:PRINT:PRINT" DO Y OU WANT LIGHT PRINT ON

DARK BACKGROUND OR DARK PRINT ON

LIGHT BACKGROUND?":PRINT:PRINT" PRINT TYPE? <D>ARK OR <L>IGHT": SOUND140,1:00SUB20

200 IFIKS="D"THEN PR=0:BG=1 ELSE PR=1:BG=0

210 CLS: PRINT@72, "DATA ENTRY MOD ES": PRINT: PRINT: PRINT: PRINTTAB(1 O) "<M>ANUAL": PRINTTAB(10) "<A>UTO ":PRINTTAB(10)"<S>AVED GRAPH":SO UND140,1:60SUB20

220 IFIK = "M"THENGOTO260ELSE IFI K\$="A"THENGOTO100ELSE IFIK\$="S"T HENGOTO160

230 CLS:PRINT"MUST CHOOSE AVAILA BLE OPTION":SOUNDS.3:FORZZ=1TO80 0: NEXT: GOTO210

258 '

259 'DATA INPUT

260 CLS: I=0: SUMF=0

270 I=I+1:IFI>9THEN340

280 INPUT"DESIRED LABEL" (F\$(I)

290 F\$(I)=LEFT\$(F\$(I).8)

300 IFF\$(I)=""ORF\$(I)="Q"AND I>1 THEN340

310 INPUT"AMOUNT/VALUE "; F(I)

320 SUMF=SUMF+F(I)

330 GOT0270

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The Color Computer has a powerful ally in FILMASTR. This is a DATA MANAGEMENT SYSTEM that you can trust. FILMASTR combines the best features of the big systems to provide a combination of speed, power, and ease of operation that can't be beat.

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340 CLS:FORK=1TD I-1:P(K)=F(K)/S UMF: PRINTF#(K); TAB(10)F(K); TAB(2 O); PRINTUSING". ##"; P(K): NEXT 350 PRINT: PRINT" DATA OK (Y/ N) ?": SOUND140, 1: GOSUB20 360 IFIK = "N"THENGOTO260 370 CLS: PRINT: PRINTTAB (5) "SAVE I NPUT DATA (Y/N)?":SOUND140,1:GOS UB20: IFIK\$="Y"GOSUB1490 398 " 399 'PIEGRAPH PLOT 400 PMODE4, 1: COLOR PR. BG: PCLS: GO 410 POKE65495, 0:CP=0 420 LINE(153, 115) - (78, 115), PSET 430 FORK=OTO I-2 440 CP=CP+P(K+1) 445 IFK=I-2 AND ABS(1.0-CP)<.005 THEN CP=1.0 450 CIRCLE(78,115),75,PR,.93,0,C P:S=PEEK(190):E=PEEK(192) 460 LINE(S,E)-(78,115),PSET 470 NEXT 480 POKE65494, 0 490 GOSUB20: GOSUB1370 500 SCREEN1,0:GOSUB20 510 CLS:PRINT:PRINTTAB(7) "SAVE G RAPH?": SOUND140.1: GOSUB20: IFIK#= "Y"THENGOSUB1540 520 CLS:PRINT:PRINTTAB(8) "WANT H ARD COPY?":SOUND140,1:GOSUB20:IF IK\$="Y"THENGOSUB1570 530 CLS:PRINT:PRINTTAB(11)"FINIS HED?": SOUND140, 1: GOSUB20: IFIK\$=" Y"THENCLS: END 540 CLS: PRINT"WANT TO REVERSE PR INT AND BACK- GROUND (Y/N)?":SOU ND140, 1: GOSUB20: IFIK = "Y"THEN TE =PR:PR=BG:BG=TE:GOTO210 ELSE GOT 0210568 * 569 ' LTRS & NUMBERS 570 L\$(33)="BM+1,OU4E2R1F2D4BL3B U2R2BD2BR3" 580 L\$(5)="BM+1,0E6BL5D1R1U1L1BF 5D1L1U1R1BD1BR3"'% 590 L\$(34)="BM+2,0U6BL1R3F1D1G1L 1R1F1D1G1L3BR7" 600 L\$(15)="NE6BR7""/ 610 L\$(35)="BM+5,-5H1L2G1D4F1R2E 1BD1BR3" 620 L\$(29)="BM+1, OBU2R3BU2L3BD4B R7"'= 630 L\$(36)="BM+1,0U6R2F2D2G2L3BR 640 L\$(37)="BM+5, OL4U6R4BD3BL2L1 BD3BR6" 650 L\$(38)="BM+1,0U6R4BD3BL2L1BD

660 L\$(39)="BM+5,-5H1L2G1D4F1R3U

3BR6"

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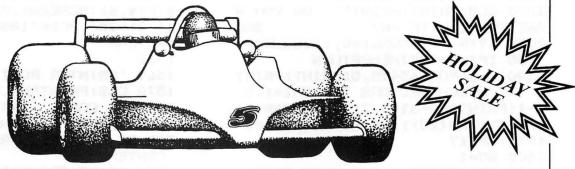
```
1039 ' HIRES SCREEN FORMAT
2L1R3BR3BD2"
                                        1040 CLS:PRINT" WANT LARGE TITLE
670 L$(40)="BM+1,0U6BR4D6BL3BU3R
                                         PRINT (Y/N)?":PRINT"
                                                                    LARGE
3BR4BD3"
                                         = 15 CHAR MAX":PRINT"
                                                                     STD
680 L*(41)="BM+5,-6L4R2D6L2R4BR3
                                          = 30 CHAR MAX": SOUND140, 1: 608U
                                        B20: IFIK = "Y"THEN PRINT@33. ">>>>
690 L$(42)="BM+1,-2D1F1R2E1U5BD6
                                        "; ELSE PRINT@65, ">>>>";
BR3"
                                        1050 PRINT@96, "": INPUT"GRAPH TIT
700 L$(43)="BM+1,0U6D3R1E3G3F3BR
                                        LE"; TI$: INPUT"SUBTITLE"; STI$: TP$
3"
710 L$(44)="BM+1.-6D6R4BR3"
                                        =IK$
                                        1060 CLS: PRINT" WANT PERCENTAGES
720 L$(45)="BM+1,0U6R1F2D1U1E2R1
                                         AND AMOUNTS ON
                                                               GRAPH (Y/N
D6BR3"
                                        ) ?": SOUND140, 1: GOSUB20
730 L$(46)="BM+1,OU6R1D1F4D1R1U6
                                        1070 LAS-IKS:SCREEN1.0
                                        1080 IFTP#="Y"THEN TC=16:TS#="S8
740 L$(47)="BM+5,-1U4H1L2G1D4F1R
                                        ":T18$="24":TI$=LEFT$(TI$,15):X1
750 L$(48)="BM+1,0U6R3F1D1G1L2BR
                                        $="13" ELSE TC=8:TS$="$4":T1S$="
                                        18":TI$=LEFT$(TI$,30):X1$="9"
6BD3"
                                        1090 POKE 65495,0:X$=TI$:IFTI$="
760 L$(49)="BM+5.-1U4H1L2G1D4F1R
                                        "THEN1110
                                        1100 P$="BM"+STR$(128-INT(TC*(LE
770 L$(50)="BM+1,0U6R3F1D1G1L2R1
                                        N(TI$))/2))+","+X1$+";"+TS$+";":
D1F2BR3"
780 L$(51)="BM+1,-1F1R2E1H4E1R2F
                                        DRAWP$: GOSUB40
                                        1110 X = LEFT $ (STI $, 30): IFSTI = ""
1BD5BR3"
790 L$(52)="BM+3,0U6L3R6BR2BD6"
                                        THEN1150
                                        1120 P$="BM"+STR$(128-INT(8*(LEN
800 L$(53)="BM+1,-6D5F1R2E1U5BD6
                                        (X$))/2))+","+T1S$+";S4;":DRAWP$
                                        : GOSUB40
810 L$(54)="BM+1,-6D4F2E2U4BD6BR
3"
                                        1148 '
                                        1149 ' PRINT LABELS?
820 L$(55)="BM+1,-6D6R1E2U1D1F2R
1U6D6BR3"
                                        1150 FORK=1TO I-1
                                        1160 PL="BM155,"+STR$(20+18*K)+
830 L$(56)="BM+1,0U1E4U1BL4D1F4D
                                        " : 54: "
840 L$(57)="BM+1,-6D1F2D3U3E2U1B
                                        1170 ZL$="BM162,"+STR$(29+18*K)+
D6BR2"
                                        99 g 99
850 L$(58)="BM+1,-6R4D1G4D1R4BR3
                                        1180 PT(K)=100*P(K)
                                        1190 X$=STR$(K)+" "+F$(K):DRAWPL
860 L$(0)="BM+1,0BR7"
                                        $: GOSUB40
                                        1200 IFLA$="N"THEN1230
870 L$(14)="BM+2,OR1BR2"
880 L$(17)="BM+2,-4E2D6BR4"
                                        1210 QQ$=STR$(PT(K)):RR$=STR$(F(
890 L$(18)="BM+1,-5E1R2F1D1L1G3D
                                        K))
1R4BR3"
                                        1220 X$=LEFT$(RR$,7)+LEFT$(QQ$,4
900 L$(19)="BM+1,-1F1R2E1U1H1E1U
                                        ) + "%; ": DRAWZL $: GOSUB40
1H1L2G1BD5BR7"
                                        1230 NEXT
910 L$(20)="BM+4,0U6L1G2D1R5BD3B
                                        1258 '
R3"
                                        1259 'SECTOR CENTER LOCATIONS
920 L$(21)="BM+1,-1F1R2E1U1H1L3U
                                        1260 SUMF=0: PSUM=0
3R5BR3BD6"
                                        1270 FORK=OTO I-1
930 L$(22)="BM+5,-6L3G1D4F1R2E1U
                                        1280 SUMF=SUMF+P(K+1):PSUM=SUMF-
1H1L2BR6BD3"
                                        P(K+1)/2
940 L$(23)="BM+1,-6R5D2G4BR7"
                                        1290 CIRCLE (78, 115), 70, BG, .93, 0,
950 L$(24)="BM+1,-1U1E1R2E1U1H1L
                                        PSUM: A(K)=PEEK(190): B(K)=PEEK(19
2G1D1F1R2F1D1G1L2BR6"
                                        2): IFK=OTHEN B(K)=B(K)+3
960 L$(25)="BM+1,OR3E1U4H1L2G1D1
                                        1300 IFK>OTHEN1340
F1R2BD3BR4"
                                        1310 CIRCLE (78, 115), 72, BG, .93, 0,
970 L$(16)="BM+6,-1U4H1L2G1D4F1R
                                        PSUM: S=PEEK (190): E=PEEK (192)
2BR4"
                                        1320 LL$="BM"+STR$(S)+","+STR$(E
980 L$(13)="BM+2,-3R3BD3BR2"
990 BOTO190
                                        1330 X=STR*(K+1):DRAWLL*:GOSUB4
1038 '
```

198

the RAINBOW

January 1984

YOUR COLOR COMPUTER JUST GOT WHEELS!



REVOLUTION!

You accelerate hard down a long straightaway, braking heavily at the end for a hard corner. You slice smoothly through the esses, and then boldly keep the power on for a fast sweeper. The Ferrari drifts dangerously near the edge, but you make a tiny correction in the steering, and you are through.

The finish line flashes by, and suddenly you are in the pits. The car falls silent. You see your lap times being held up. Your final lap was a new lap record! At last, you permit yourself a small smile.

You have mastered this powerful car on a difficult track, driving with the assurance and precision that comes only from long hours of practice.

You are driving an <u>authentic</u> race car. You are playing Revolution!

FANTASTIC ACTION

Revolution uses high resolution, machine language graphics for action that is smooth and fast. The emphasis is on authenticity in the control and motion of your car. As in driving a real race car, accuracy and precision in your driving are what counts. Frills and non-essentials have been left out.

PURE COMPETITION

Like a real race driver in practice and qualifying sessions, you compete against the clock and against the existing lap record for that track. *Revolution* records the lap records and the name of the person who set the record, so you always know who reigns supreme on your favorite track!

DESIGNED WITH YOU IN MIND

Revolution is menu-driven, and self explanatory. Information screens tell you what you need to know. When you're ready to play, a menu of the names of all your tracks is displayed, along with the lap record for each track and the name of the person who set that lap record. You select a track with a single keystroke, and Revolution takes you there.

A NEW CONCEPT

Revolution is a unique game, because it allows you to create the most important part of any race game: the track itself.

The first time you run *Revolution*, you will be able to choose from several tracks and cars which are included with the game.

But, with *Revolution*, this is only the beginning! You can create as many tracks as you like. You can make each new track as difficult or as easy as you wish. You can make easy ones to begin with, and tougher ones as you become more skilled. You may find creating tracks to be almost as much fun as driving on them!

You can save your favorite tracks to run on again whenever you wish. *Revolution* will automatically add these new tracks to the menu. And you can exchange your favorite tracks with other *Revolution* owners.

Be careful, though, about letting your friends play this game. They may not want to let you have your computer back!

THE EARLY REVOLUTION

A prototype version of *Revolution* was published in the September, 1982 issue of Rainbow magazine, under the name *The Track*. The response to *The Track* has been terrific.

Revolution has all the features that have made *The Track* a favorite, and *Revolution*'s fast, high-resolution machine language graphics are dramatically improved over the prototype's.

REVOLUTION NOW!

The original *Revolution* for the TRS-80TM Color Computer requires 32K and one disk drive. A new cassette version has action just like the disk version, and similar track-saving features excluding a menu of available tracks. The cassette version will run on a 32K Color Computer or TDP-100. You can upgrade to the disk version later, too, for a nominal fee.

REVOLUTION

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1340 NEXT: POKE65494, 0: RETURN 1368 ' 1369 ' HI-LITE SECTORS DO YOU W 1370 CLS:PRINT:PRINT" ANT TO HI-LITE ANY TORS (Y/N)?": SOUND140, 1: 808UB20 1380 IFIK+="N"THENRETURN 1390 CLS:POKE65495, O:PRINT:PRINT WHICH SECTORS ?":FORZ=1TO I-1:PRINT@40+32*Z, Z;:PRINTTAB(10)F\$(Z)|TAB(20)|:PRINT USING".##" FP(Z):NEXT 1400 QQ=1 1410 PRINT@455," 'F' WHEN FINISH ED" 1420 GOSUB20 1430 IFIK = "F"THEN1460 1440 Z=VAL(IK\$):PRINT@39+32*Z,"> "; :PAINT(A(Z-1),B(Z-1)),PR,PR 1450 QQ=QQ+1:IFQQ<I THEN1420 1460 POKE65494, O: RETURN 1488 ' 1489 'DATA SAVE ROUTINE 1490 CLS: INPUT"ENTER DATA FILE N AME"; NF :: IFNF == "Q"THEN RETURN EL SE NF#=LEFT#(NF#,8):OPEN"O",#1,N F\$ 1500 WRITE#1, I, SUMF 1510 FORKK=1TO I-1:WRITE#1.F*(KK), F(KK): NEXT: CLOSE: RETURN



1538 °

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1539 'GRAPH SAVE ROUTINE 1540 CLS: INPUT"GRAPH NAME" FI : I FFI = "Q"THEN RETURNELSE FI =-LEFT *(FI*,8):SCREEN1,0:SAVEMFI*,PEEK (188) *256, PEEK (188) *256+6143, 380 : RETURN 1548 ° 1569 'PRINTER ROUTINES 1570 CLS:PRINT"HALF AND FULL WID TH PAGE COPY ARE AVAILABLE." 1580 PRINT: PRINT"HALF PAGE COPY RIGHT, LEFT, OR CAN BE LOCATED CENTER." 1590 PRINT: PRINT"DO YOU WANT HAL F OR fULL PAGE?": SOUND140, 1: GOSU 1600 IFIK*="F"ORIK*="f"THEN GOTO 1630 1610 IFIK\$="H"ORIK\$="h"AND CC=OT HEN GOSUB1650 ELSE LOADM"GSPRP": CC=0: GOSUB1650 1620 SCREEN1, 0: IFPPOINT (5, 190) =1 THEN P=USR2(XP):GOTO530 ELSE P=U SR1 (XP): GOTO530 1630 IFCC=1THEN 1620 1640 S=&H7D90:POKES+37.2:POKES+4 5, 95: POKES+62, 4: POKES+67, 47: POKE S+197, 48: POKES+277, 18: POKES+278, 18: CC=1: XP=-125: GOTO1620 1650 CLS:PRINT"POSITION OF GRAPH (L/R/C)": SOUND140, 1: GOSUB20: XP\$ =IK\$ 1660 IFXP*="L"THEN XP=-160:RETUR 1670 IFXPs="R"THEN XP=125:RETURN 1680 XP=0:RETURN 1690 PCLEAR4: GOTO70

1700 DATA 198,32,182,1,90,142,4, 0,167,128,140,4,31,38,249,142,5, 224,167,128,140,6,0,38,249,142,4 ,32,167,132,167,31,58,140,6,0,38 ,246,57

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16K ECB



Twenty Odd-Ball Screen Routines

By Gregory Clark

ave you ever been in the middle of writing a large program and realized that you needed something to fill in a small time delay or a visual gap in the on-screen proceedings? Now you have to put your main program on the back burner and come up with a small subroutine. Well, this has happened to me several times; some of the routines in this program are the result. Others I wrote just to come up with a round number.

There are timers, counters, time-wasters, and one stolen in whole from a very early issue of *the Rainbow*. The timers in themselves are not accurate, it is up to you to provide the timing interval within your own program for that.

They all have one thing in common — they cause something visual to happen on the text screen. Since there is no one way to do things when writing a BASIC program, I'm not claiming that the methods used are the best. I have offered these routines as an example of several ways to accomplish

time delays and counting. If you should happen to suddenly have an insight and come up with a better way, I will be rewarded in a small way by possibly having helped.

Some of these routines require Extended BASIC. If you are not familiar with *POKEing* into the text screen, then I suggest starting with the last routine *Strange Characters*, as the *CHR\$* and *POKE* values used in many of these routines are not the same.

After writing the main program, I realized that there are actually 21 subroutines. The 21st being the method I used to display the listing of the routines and *POKE* values in *Strange Characters*.

If there are others out there with similar collections of odds and ends, think about putting them together and sending them in to *the Rainbow*. You do not have to come up with a major programming feat in order to help other programmers, sometimes small tidbits are very welcome.

12060 ..115B
12.....01E6 13085 ..1385
191....04D8 13200 ..15E9
3040 ..0777 16010 ..1816
70....09BE 18030 .1AC2
9010 .0BD2 20030 ..1E40
11050 .0EEB END ..2108

The listing:

1 CLEAR500:DIMQ1\$(20):CLS:Q1=1:Q
1\$(1)=" 1=1/4 BLOCK-COLOR CHANGE
2 Q1\$(2)=" 2=SINGLE DOT/L-R
3 Q1\$(3)=" 3=SINGLE BAR/L-R
4 Q1\$(4)=" 4=MULTIPLE POINTS-CHA
NGE COLOR
5 Q1\$(5)=" 5=RANDOM TIME WASTER
6 Q1\$(6)=" 6=MULTIPLE TIME WASTE
R
7 Q1\$(7)=" 7=DOUBLE BLOCKS/L-R+R
-L
8 Q1\$(8)=" 8=COUNTER/OTO99
9 Q1\$(9)=" 9=COUNTER/OTO999

10 Q1\$(10)="10=12 HOUR CLOCK-HOU

(Greg Clark works for New York Telephone Co. and in his spare time enjoys writing Adventure programs. His wife, Ruth, is quietly supportive of the time spent at his hobby.)

11 Q1\$(11)="11=24 HOUR CLOCK-HOU RS+MINUTES +SECONDS+COLOR CHANG E FOR PM

12 Q1\$(12)="12=COUNTDOWN DOUBLE BAR

13 Q1\$(13)="13=CLOCK FACE TIMER 14 Q1\$(14)="14=4 BLOCK COLOR CHA NGE

15 Q1\$(15)="15=0-9 NUMERIC-SHIFT CHANGE

16 Q1\$(16)="16='TIMES SQUARE HEA DER' STOLEN FROM the RAINBOW VOL I NO5

17 Q1\$(17)="17=COUNTDOWN W/TONES 18 Q1\$(18)="18=ACROSS BOTTOM DOU BLE BAR

19 Q1\$(19)="19=1 BLOCK-CORNERS C HANGE

20 Q1\$(20)="20=HIDDEN CHARACTERS 100 AA=1:AB=1024

101 A\$="L100AP10AP10DP10CCD":B\$=
"L200A"

110 CLS:PRINT@256," TWENTY ODDBA LL SCREEN ROUTINES":PRINT@465,"B Y greg clark":FORY=1T010:PLAYA\$: NEXT

120 CLS: PRINT@224, "CHANGE VALUE

RS+MINUTES

```
OF Y IN LINE 200 TOSPEED UP OR S
LOW DOWN EXECUTION
                             OF F
XAMPLES": FORY=1T03000: NEXT
190 AA=0:AB=0:AC=0:AD=0:AE=0:AF=
O:AZ=O:FORX=1T01000:NEXT:CLS:PRI
NT@256, "ENTER # OF CHOICE (99 FO
R LIST) PRESS <E> TO EXIT DURING
RUN": INPUTXX
191 IFXX=99THENGOTO60000ELSEIFXX
<O DR XX>20THENPLAY"L10A":GOTO19
193 PRINT@352,Q1$(XX)
195 ON XX GOSUB1000,2000,3000,40
00,5000,6000,7000,8000,9000,1000
0,11000,12000,13000,14000,15000,
16000, 17000, 18000, 19000, 20000
197 E$=INKEY$: IFE$="E"THEN190
200 FORY=1T0300:NEXT:60T0195
205 GOT0195
1000 REM 1/4 BLOCK-COLOR CHANGE
1005 IFAZ=OTHENAA=136:AZ=1
1010 PLAYB$: POKE1024, AA
1020 AA=AA+16: IFAA>248THENAA=136
:AB=AB+1: IFAB>10THEN1040
1030 RETURN
1040 PLAYA$: CLS: GOTO190
2000 REM SINGLE DOT-MOVES ACROSS
SCREEN
2001 REM AA, AB
2005 IFAZ=OTHENAA=1: AB=1024: AZ=1
2010 PLAYB$: ON AA GOTO2030, 2040
2030 POKEAB-1,143:POKEAB,135:AA=
2: RETURN
2040 POKEAB, 139: AA=1: AB=AB+1
2050 IFAB>1055THEN2060ELSERETURN
2060 PLAYA$: CLS: GOTO190
3000 REM SINGLE BAR
3001 REM AA,AB
3005 IFAZ=OTHENAA=1:AB=1024:AZ=1
3010 PLAYB$: ON AA GOTO3020,3030
3020 POKEAB, 135: AA=2: RETURN
3030 POKEAB, 131: AB=AB+1: AA=1
3040 IFAB>1055THEN3050ELSERETURN
3050 PLAYA$:CLS:GOT0190
4000 REM MULTIPLE POINTS-CHANGE
COLOR
4005 IFAZ=OTHENAA=1:AB=1532:AZ=1
:FORX=1532T01535:POKEX,191:NEXT
4010 PLAYB$:AC=AC+1:ON AA GOTO40
20,4030,4030,4030
4020 POKEAB+3,191:POKEAB,159:AA=
AA+1:AB=AB+1:RETURN
4030 POKEAB-1,191:POKEAB,159:AA=
AA+1:AB=AB+1
4040 IFAB=1536THENAB=1532:AA=1
4045 IFAC=20THEN190
4050 RETURN
5000 REM RANDOM TIME WASTER
5010 IFAZ=OTHENAA=RND(-TIMER):AZ
```

=1

```
5020 PLAYB$: AA=RND(128): AA=AA+12
7: POKE1135. AA
5030 AB=AB+1: IFAB=20THEN190
5040 RETURN
6000 REM MULTIPLE TIME WASTER
6010 IFAZ=OTHENAA=RND(-TIMER):AZ
6020 AA=RND(128)+127:PLAYB$:AB=A
B+1:0N AB GOTO6030,6040,6050,606
6030 POKE1134, AA: RETURN
6040 POKE1135, AA: RETURN
6050 POKE1136, AA: RETURN
6060 AB=0:POKE1137,AA
6070 AC=AC+1: IFAC=5THEN190
6080 RETURN
7000 REM DOUBLE BLOCKS/L-R+R-L
7010 IFAZ=OTHENAA=1:AB=1504:AC=1
535: AD=159: AF=1: AZ=1
7020 PLAY"L100"+C$:POKEAB.AD:POK
EAC, AD
7030 AB=AB+1:AC=AC-1
7040 IFAB=1520THENAD=AD+16:AE=AE
+1: AF=AF+1
7050 IFAB=1536THENAB=1504:AD=AD+
16: AF=AF+1: AC=1535
7060 IFAD>252THENAD=159
7065 IFAF=8THENAF=1
7070 IFAE>10THEN190
7075 C$=STR$(AF):C$=";"+C$
7080 RETURN
8000 REM COUNTER/OT099
8010 IFAZ=OTHENFORX=1128T01131:P
OKEX, 239: NEXT: AA=48: AB=48: AZ=1
8015 PLAYB$:POKE1129,AA:POKE1130
. AB
8020 AB=AB+1: IFAB=58THENAB=48: AA
=AA+1
8030 IFAA=58ANDAB=48THENPLAYA$:G
0T0190
8040 RETURN
9000 REM COUNTER/OT0999
9010 IFAZ=OTHENPOKE1086, 175: POKE
1214.175: AA=112: AB=112: AC=112: AZ
=1
9020 PLAYB$:POKE1118, AA:POKE1150
, AB: POKE1182, AC
9030 IFAA=121ANDAB=121ANDAC=121T
HENPLAYAS: GOTO10
9040 AC=AC+1: IFAC=122THENAC=112:
AB=AB+1: IFAB=122THENAB=112: AA=AA
+1
9050 RETURN
10000 REM 12 HOUR CLOCK-HOURS+MI
NUTES
10010 IFAZ=OTHENPOKE1484,159:POK
E1487, 122: POKE1490, 159: AA=112: AB
=112: AC=112: AD=112: AZ=1
```

10020 PLAYB\$: POKE1485, AA: POKE148

6, AB: POKE1488, AC: POKE1489, AD

10030 IFAA=113ANDAB=114THENPLAYA \$:GOT0190

10040 AD=AD+1: IFAD=122THENAD=112 :AC=AC+1:IFAC=118THENAC=112:AB=A B+1: IFAB=122THENAB=112: AA=AA+1 10050 RETURN

11000 REM 24 HOUR CLOCK-HOURS+MI NUTES+SECONDS+COLOR CHANGE FOR P

11010 IFAZ=OTHENPOKE1024,223:POK E1027, 122: POKE1030, 122: POKE1033, 223: AA=112: AB=112: AC=112: AD=112: AE=112: AF=112: AZ=1

11015 IFAG=1THEN11100

11020 POKE1025, AA: POKE1026, AB: PO KE1028.AC: POKE1029.AD: POKE1031.A E:POKE1032, AF

11030 IFAA=113ANDAB=114THENAG=1: RETURN

11040 AF=AF+1: IFAF=122THENAF=112 :AE=AE+1:IFAE=118THENAE=112:AD=A D+1: IFAD=122THENAD=112: AC=AC+1: I FAC=118THENAC=112: AB=AB+1: IFAB=1 22THENAB=112: AA+AA+1

11050 RETURN

11100 IFAZ=1THENAA=49:AB=50:AC=4 8: AD=48: AE=48: AF=49: POKE1027, 58: POKE1030,58:AZ=2

11110 POKE1025, AA: POKE1026, AB: PO KE1028, AC: POKE1029, AD: POKE1031, A

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E:POKE1032, AF

11120 IFAA=50ANDAB=52THENPLAYA\$: GOTO190

11130 AF=AF+1: IFAF=58THENAF=48: A E=AE+1: IFAE=54THENAE=48: AD=AD+1: IFAD=58THENAD=48: AC=AC+1: IFAC=54 THENAC=48: AB=AB+1: IFAB=58THENAB= 48: AA=AA+1

11140 RETURN

12000 REM COUNTDOWN DOUBLE BAR

12010 IFAZ=OTHENFORX=1120T01151: POKEX, 179: NEXT: AA=1151: AB=1151: P OKE1151, 191: AZ=1

12020 AE=PEEK(AA): AA=AA-1: AC=PEE K(AA)

12025 IFAA=1119THENAD=PEEK(1120) :IFAD=191THENAA=1151:POKE1120,17 9: POKEAB, 176: AB=AB-1: POKEAA, 188: PLAYB\$: RETURN

12030 IFAC=179THENPOKEAA, 191: IFA E=188THENPOKEAA+1,176ELSEPOKEAA+ 1.179

12040 IFAC=176THENPOKEAA, 188: IFA E=188THENPOKEAA+1,176ELSEPOKEAA+ 1.179

12050 IFAA=1120ANDAC=176THENPOKE 1120,176:PLAYA\$:GOTO190

12060 RETURN

13000 REM CLOCK FACE TIMER

13010 IFAZ=OTHENFORX=1024T01039: FORY=OTO7: POKEX+(Y*32), 128: NEXTY , X: AA=1032: AB=1: AZ=1: POKE1127, 22 5: POKE1128, 226: POKE1159, 228: POKE 1160,232:POKE1063,172:POKE1064,1 72

13014 PLAYB\$

13015 ON AB GOT013020,13040,1305 0,13060,13070,13080

13020 POKEAA, 220: POKEAA-1, 128: AA =AA+1

13025 IFAA=1040THENAB=2:AA=1039

13030 IFAA=1032THEN13090

13035 RETURN

13040 POKEAA, 211: AA=AA+32: AB=3

13045 RETURN

13050 POKEAA, 220: POKEAA-32, 128: A B=2

13055 IFAA=1263THENAB=4

13057 RETURN

13060 POKEAA, 211: IFAC=OTHENAB=4:

AA=AA-1:AC=1:ELSEPOKEAA+1,128:AB =4: AA=AA-1

13065 IFAA=1247THENAA=1248:AB=5

13067 RETURN

13070 POKEAA, 220: AA=AA-32: AB=6

13072 IFAA=992THENAA=1025:AB=1

13075 RETURN

13080 POKEAA, 211: POKEAA+32, 128: A B=5

13085 RETURN

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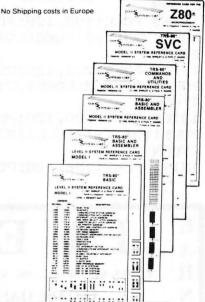
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13200 POKE1122, 128: POKE1154, 128: POKE1091, 163: POKE1124, 172: AD=11: RETURN 13210 POKE1091, 128: POKE1124, 128: POKE1061, 163: POKE1094, 172: AD=12: 13220 POKE1061,128:POKE1094,128: POKE1063, 172: POKE1064, 172: PLAYA\$:GOTO190 14000 REM 4 BLOCK COLOR CHANGE 14010 IFAZ=OTHENCLSO:POKE1423,13 2: POKE1424, 132: POKE1425, 132: POKE 1426, 132: AA=1423: AB=148: AZ=1: RET URN 14015 PLAY B\$ 14020 POKEAA, AB+(16*AC): AA=AA+1 14030 IFAA=1427THENAA=1423:AC=AC 14040 IFAC=7THENPLAYA\$:GOTO190 14050 RETURN 15000 REM 0-9 NUMERIC-SHIFT CHAN 15010 IFAZ=OTHENFORX=OTO9:POKE10 35+X,112+X:NEXT:AZ=1:AA=1035:POK E1035, 48: AB=112: AC=49: RETURN 15020 PLAYB\$: POKEAA. AB: POKEAA+1. AC 15030 AC=AC+1:AB=AB+1:AA=AA+1 15040 IFAA=1044THENPLAYA\$:GOTO19 15050 RETURN 16000 REM "TIMES SQUARE HEADER" 16005 REM ENTER YOUR OWN TEXT IN PLACE OF RB\$ 16010 CLSO 16020 RB\$=" -- THIS PROGRAM APPEARED IN 'the RAINBOW' VOLUME I NO 5 (TOTAL PA GES=20 INCLUDING COVERS). I HAVE NEVER SEEN IT RE-PRINTED ANYWHE RE AND INCLUDE IT HERE FOR THE N EWER 'RAINBOW' READERS--------"+STRING\$(16,32) 16030 FORAA=1 TO LEN(RB\$)-15:AB= AB+1: IFAB>4 THEN AB=1:E=1125:EE= 1140 16040 PRINT@328, MID\$ (RB\$, AA, 15); 16050 SOUND RND(240), 1: NEXTAA 16060 GOTO190 17000 REM COUNTDOWN W/TONES 17010 IFAZ=OTHENFOR AD=1055T0153 5STEP32: POKEAD, 239: NEXTAD: AA=105 5: POKEAA, 227: AB=1: SOUNDAB, 1: AC=1 :AZ=1:RETURN 17015 AB=AB+7: IFAA=1567 THENPLAY A\$: GOTO190 17020 ON AC GOTO 17030,17040 17030 POKEAA, 140: SOUNDAB, 1: AC=2:

POKE1122, 163: POKE1154, 172: AD=10:

RETURN

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AA=AA+32: RETURN 17040 POKEAA, 227: POKEAA-32, 143: S OUNDAB, 1: AC=1: RETURN 18000 REM ACROSS BOTTOM-DOUBLE B AR/AC=1/AB=1504 18010 IFAZ=OTHENAC=1:AB=1504:AZ= 1 18020 REM AA, AB, AC 18030 IFAA=OTHEN18100 18040 PLAYB\$: ON AC GOT018050,180 60,18070,18080 18050 POKEAB, 247: AC=AC+1: RETURN 18060 POKEAB, 245: AC=AC+1: RETURN 18070 POKEAB, 241: AC=AC+1: RETURN 18080 POKEAB, 240: AC=1: AB=AB+1 18090 IFAB=1536THEN18110ELSERETU 18100 FORX=1504T01535:POKEX, 255: NEXT: AA=1: GOTO18040 18110 PLAYA\$:CLS:GOTO190 19000 REM 1 BLOCK - CORNERS CHAN GE/AA=1 19010 IFAZ=OTHENAA=1:AZ=1 19020 PLAYB\$: ON AA GOTO19030,190 40, 19050, 19060 19030 POKE1024,216:AA=AA+1:RETUR 19040 POKE1024, 228: AA=AA+1: RETUR

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(813) 321-2840 9am - 5pm EST 19050 POKE1024,242:AA=AA+1:RETUR 19060 POKE1024, 193: AA=1: AB=AB+1 19070 IFAB>10THEN19080ELSERETURN 19080 PLAYA\$:CLS:GOT0190 20000 REM HIDDEN CHARACTERS 20010 W1=0:CLS:PRINT@32, "THERE A RE SOME INTERESTING CHAR-S HIDDEN IN YOUR COCO":FORAA=1TO 2000: NEXT: PRINT@128, "USING THE C HR\$() FORMAT YOU CANUSE THOSE C HARACTERS SHOWN IN THE RADIO S HACK MANUALS, BUT HAVEYOU SEEN TH

N

ESE?"

20020 AB=27:FORX=1440T01471:POKE X, AB: AB=AB+1: NEXT: FORX=1T06000: N EXT

20030 CLS:PRINT@128, "THESE CHARA CTERS ARE AVAILABLE USING POKES TO THE SCREEN MEMORYLOCATIONS 1 024-1535. PRINT@0, "CHR\$(34) "a"CH R\$(34)"OR PRINT@O, CHR\$(97) IS TH E SAME AS POKE1024,1"

20040 FORX=1TO6000:NEXT:CLS:PRIN T"THE FORMAT IS POKEXXX, YYY. XXX X=DIGIT BETWEEN 1024 AND 1535 AN D YYY=DIGIT BETWEEN O AND 255" 20050 PRINT"USE UP AND DOWN ARRO WS TO MOVE THE DISPLAY. ENTER < E> TO EXIT"

20055 W1=0:PRINT@352, "POKE1392," W1"=":POKE1392,W1

20060 W1\$=INKEY\$:IFW1\$=""THEN200 60

20070 IFW1\$="E"THEN190

20075 IFW1\$<>"^" AND W1\$<>CHR\$(1 O) THENSOUND10, 1: GOTO20060

20080 IFW1\$="^"THENW1=W1+1:IFW1>

255THENW1=0

20090 IFW1\$=CHR\$(10)THENW1=W1-1: IFW1<OTHENW1=255

20100 PRINT@352, "POKE1392, "W1"=" :POKE1392,W1:GOTO20060

20999 FORX=1T02000:NEXT:GOT0190 60000 REM LIST

60005 Q1=1:CLS:PRINT"USE UP AND DOWN ARROWS TO LOOK AT LIST-PRE SS <E> TO EXIT":PRINTQ1\$(1)

60010 Q1\$=INKEY\$:IFQ1\$=""THEN600 10

60013 IFQ1\$="E"THEN190

60015 IFQ1\$<>"^" AND Q1\$<>CHR\$(1 O) THENSOUND10, 1: GOTO60010

60020 IFQ1\$=CHR\$(10)THENQ1=Q1-1: IFQ1<1THENQ1=20

60030 IFQ1\$="^"THENQ1=Q1+1:IFQ1> 20THENQ1=1

60040 PRINT:PRINTQ1\$(Q1):GOTO600



N

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Four For Fun

By Paul Wesley Myers

eing the father of two pre-schoolers, one of the first undertakings I attempted on my 4K CoCo was to get the kids involved. After all, telling my wife it was for the kids was the only way I could justify its purchase in the first place. The first two programs listed here are written for the 4K, non-Extended BASIC CoCo. The third, a light entertainment program requires 16K, non-Extended BASIC. With some little work, it could be cut down to fit on a 4K machine also. The last program needs 16K Extended BASIC. Please forgive the rather rag-tag lettering used in it, it was my first attempt at high-resolution graphics.

The first program, called Key-Fun, is just that. It is designed to be an ice-breaker to the computer. The program draws a clown's face on the screen, then puts a letter on the clown's nose. If the child presses the letter that matches it on the keyboard, the clown smiles and he/she hears an assending sound. Even for the child who doesn't know the alphabet

yet, it's a chance to get in on the fun.

The second program is a little more advanced, and requires the child to have a little knowledge of the alphabet. All of the letters are shown on the screen, and then one is "blacked out." If the child presses the correct "missing letter", a short rendition of "Pop Goes The Weasle" plays, and another letter is darkened. When my oldest daughter started to play with this one, and she didn't know the answer right off, she'd break into a chorus of "ABCD . . . " It works as a great reinforcer.

The third program was written as a little entertainment break. Song-Time is a collection of four well-known children's tunes. By pressing A, B, C or D, the child selects a song to be played. The program serves as a nice pause when the child begins to tire of the other programs. It's great fun. After all, he/she gets to make the music.

The last program in the group, Shapes And Colors will require a little adult help at first. Four shapes of different colors will be drawn on the right of the screen. Then on the left of the screen, a question will be asked such as "Which is blue?" or "Which is a circle?" At first, an adult will be needed to read the question to the child. But don't fret too much over this. You will be very surprised at how fast the kids will learn to recognize these words.

(Paul Myers is a programming analyst for Technicon Corporation. His eight years of data processing experience include working with both large-scale and minicomputers.)

All four of these programs use the keyboard as the input device. I've tried using the joysticks in some other programs, but have had only mixed success with them. What I'm really hoping to see on the market soon is a touch-sensitive overlay for a 13" screen that could be attached through one of the joystick ports. To all you designers out there, here's a great educational tool I hope you don't pass over.

Listing 1:

10 ' KEYBOARD FUN PAUL W. MYERS 20 '

30 ° 10/8/83

40 CLS5

50 ' DRAW NOSE

60 FOR X=10 TO 15

70 FOR Y=28 TO 33

80 SET (Y, X, 1)

90 NEXT Y, X

100 ' DRAW MOUTH

110 FOR X=20 TO 41

120 FOR Y=20 TO 21

130 SET(X,Y,4)

140 NEXT Y, X

150 ' DRAW RIGHT EYE

160 FOR X=20 TO 23

170 FOR Y=4 TO 7

180 SET(X,Y,3)

190 NEXT Y, X

DRAW LEFT EYE 200 "

210 FOR X=38 TO 41

220 FOR Y=4 TO 7

230 SET(X,Y,3)

240 NEXT Y.X

250 ° SELECT LETTER

260 V=RND(26)

270 L\$=CHR\$(V+64)

280 ' PRINT LETTER ON NOSE

290 PRINT @ 207,L\$;

300 Z\$=INKEY\$

310 IF Z\$="" THEN 300

320 IF Z\$<> L\$ THEN 570

330 ' RIGHT ANSWER

340 ' DRAW SMILE 110 FOR Y=1 TO 6 ' COLUMNS 350 FOR X=20 TO 21 120 A\$=CHR\$(A) 360 FOR Y=18 TO 19 130 PRINT @ Z.A*; 370 SET(X,Y,4) 140 PRINT @ Z+1, CHR\$(138); 380 NEXT Y, X 150 A=A+1 390 FOR X=40 TO 41 160 C=C+1 400 FOR Y=18 TO 19 170 B(C)=Z 410 SET(X,Y,4) 180 'FINISHED ? 420 NEXT Y.X 190 IF C=26 THEN 270 430 FOR S=100 TO 200 STEP 5 200 ' NEXT COLUMN 440 SOUND S,1:NEXT S 210 Z=Z+5 450 ' ERASE SMILE 220 NEXT Y 460 FOR X=20 TO 21 230 ' NEXT ROW 470 FOR Y=18 TO 19 240 Z=Z+34 480 SET(X,Y,5) 250 NEXT X 490 NEXT Y, X 260 ' SELECT LETTER TO HIDE 500 FOR X=40 TO 41 270 R=RND(26) 510 FOR Y=18 TO 19 280 PRINT @ B(R), CHR\$(128); 290 PRINT @ B(R)+1, CHR\$(133+48); 520 SET (X, Y, 5) 530 NEXT Y.X 300 PRINT @ 420, "PRESS THE MISSI 540 GOTO 260 NG LETTER"; 550 ' WRONG ANSWER 310 LS=INKEYS 560 ' DRAW FROWN 320 IF L\$="" THEN 310 570 FOR X=20 TO 21 330 IF L\$=CHR\$(64+R) THEN 400 580 FOR Y=22 TO 23 340 ' WRONG ANSWER 590 SET(X,Y,4) 350 FOR X=1 TO 3 600 NEXT Y, X 360 SOUND 110,7:SOUND 1,7 610 FOR X=40 TO 41 370 NEXT X 620 FOR Y=22 TO 23 380 GOTO 310 630 SET(X,Y,4) 390 'RIGHT ANSWER 640 NEXT Y, X 400 PRINT @ B(R),L\$; 650 FOR S=1 TO 10 410 PRINT @ B(R)+1, CHR\$(138); 420 SOUND 147.5 660 SOUND 1,2 430 SOUND 108,4 670 FOR B=1 TO 5 680 NEXT B.S 440 SOUND 133,1 690 ' ERASE FROWN 450 SOUND 125,5 700 FOR X=20 TO 21 460 SOUND 89,5 710 FOR Y=22 TO 23 470 GOTO 270 120 0122 720 SET(X,Y,5) 280 0309 730 NEXT Y.X 460 057D Listing 3: 740 FOR X=40 TO 41 END ... 0766 10 ' SONG-TIME 750 FOR Y=22 TO 23 20 ' PAUL W. MYERS 760 SET(X,Y,5) 30 ' 10/8/83 770 NEXT Y.X 40 CLEAR 20 780 GOTO 300 50 CLS3 220....017C END ... 0320 60 DIM A(84), B(52), C(64), D(64) 70 FOR X= 1 TO 84 Listing 2: 80 READ A(X): NEXT 10 ' MISSING LETTER 90 'TWINKLE TWINKLE 20 ' PAUL W. MYERS 100 DATA 89,8,89,8,147,8,147,8,1 30 ' 10/8/83 59,8,159,8 40 CLS4 50 PRINT @ 4, "WHAT LETTER IS MIS 110 DATA 147,16,133,8,133,8,125, 8,125,8,108,8,108,8 SING ?"; 60 DIM B(26) ' SAVES LOCATION OF 120 DATA 89, 16, 147, 8, 147, 8, 133, 8 ,133,8,125,8,125,8 **LETTERS** 130 DATA 108, 16, 147, 8, 147, 8, 133, 70 ' DRAW BOARD 8, 133, 8, 125, 8, 125, 8 80 A=65 140 DATA 108, 16, 89, 8, 89, 8, 147, 8, 90 Z=67 147,8,159,8,159,8 100 FOR X=1 TO 5 ' ROWS

150 DATA 147, 16, 133, 8, 133, 8, 125, 8,125,8,108,8,108,8 160 DATA 89,16 170 FOR X=1 TO 52 180 READ B(X): NEXT 190 ' JINGLE BELLS 200 DATA 125,4,125,4,125,8,125,4 , 125, 4, 125, 8 210 DATA 125,4,147,4,89,6,108,2, 125,8,255,8 220 DATA 133,4,133,4,133,6,133,2 , 133, 4, 125, 4 230 DATA 125,4,125,2,125,2,147,8 ,147,8,133,8 240 DATA 108,8,89,32 250 FOR X=1 TO 64 260 READ C(X):NEXT 270 ' ARE YOU SLEEPING 280 DATA 89,8,108,8,125,8,89,8,8 9,8,108,8,125,8 290 DATA 89,8,125,8,133,8,147,16 , 125, 8, 133, 8, 147, 16 300 DATA 147,4,159,4,147,4,133,4 ,125,8,89,8 310 DATA 147,4,159,4,147,4,133,4 ,125,8,89,8 320 DATA 89,8,147,8,89,16,89,8,1 47,8,89,16 330 FOR X=1 TO 64

SOFTWARE-HARDWARE

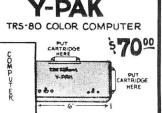
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340 READ D(X): NEXT 350 ' THIS OLD MAN 360 DATA 147,4,125,4,147,8,147,4 ,125,4,147,8 370 DATA 159,4,147,4,133,4,125,4 ,108,4,125,4,133,4 380 DATA 125,2,133,2,147,4,89,4, 89, 2, 89, 2, 89, 4 390 DATA 89,2,108,2,125,2,133,2, 147,8 400 DATA 147,4,108,4,108,4,133,4 , 125, 4, 108, 4 410 DATA 89,8 420 PRINT @ 1, "WHAT SONG DO YOU WANT TO HEAR?"; 430 PRINT @ 96, "A = TWINKLE TWIN KLE LITTLE STAR" 440 PRINT @ 160, "B = JINGLE BELL 450 PRINT @ 224,"C = ARE YOU SLE EPING" 460 PRINT @ 288, "D = THIS OLD MA N" 470 X\$=INKEY\$ 480 IF X\$="" THEN GOTO 470 490 IF X\$="A" THEN GOTO 550 500 IF X\$="B" THEN GOTO 610 510 IF X\$="C" THEN GOTO 670 520 IF X\$="D" THEN GOTO 730 530 GOTO 470 540 'TWINKLE TWINKLE 550 FOR X=1 TO 84 STEP 2 560 S=A(X):D=A(X+1) 570 SOUND S.D 580 NEXT X 590 GOTO 470 600 ' JINGLE BELLS 610 FOR X=1 TO 52 STEP 2 620 S=B(X):D=B(X+1) 630 SOUND S.D 640 NEXT X 650 GOTO 470 660 ' ARE YOU SLEEPING 670 FOR X=1 TO 64 STEP 2 680 S=C(X):D=C(X+1) 690 SOUND S.D 700 NEXT X 710 GOTO 470 720 ' THIS OLD MAN 730 FOR X=1 TO 64 STEP 2

MADE OF STURDY PLASTIC.

10 ' SHAPES AND COLORS 20 ' PAUL W. MYERS

740 S=D(X):D=D(X+1)

750 SOUND S.D

760 NEXT X 770 GOTO 470

the RAINBOW January 1984

30 ' 10/8/83 40 CLEAR 300 50 DIM A\$(8) 60 GOSUB 610 70 PMODE 3,1 80 SCREEN 1.0 90 PCLSO 100 ' DRAW GREEN CIRCLE 110 CIRCLE (180,25),20,1 120 PAINT (180,25),1 130 ' DRAW YELLOW SQUARE 140 DRAW "BM163,55;C2;R35;D29;L3 5; U29" 150 PAINT (170,65),2 160 ' DRAW BLUE TRIANGLE 170 DRAW "BM163,120;C3;R36;H18;G 18" 180 PAINT (170,119),3 190 ' DRAW RECTANGLE 200 DRAW "BM150,138;C1;R60;D30;L 60; U30" 210 ' DRAW NUMBER ONE 220 DRAW "BM235,15;D20" 230 ' DRAW NUMBER TWO 240 DRAW "BM230,60;R10;D10;L10;D 10;R10" 250 ' DRAW NUMBER THREE

260 DRAW "BM230,100;R10;D10;NL5; D10; L10" 270 ' DRAW NUMBER FOUR 280 DRAW "BM230,145;D10;R10;NU10 5 D10" 290 ' "WHICH IS" 300 DRAW "BM20,70; D10; E5; F5; U10; BR5; D10; U5; R5; U5; D10; BR5; U10; BR5 ; NR5; D10; R5; BR5; U10; D5; R5; NU5; D5 ; BR15; U10; BR5; NR5; D5; R5; D5; L5" 310 X=RND(8) 320 IF X=Y THEN 310 330 IF X>4 THEN DRAW "BM100,80;U 8; E2; R1; F2; D3; NL5; D5; " ' "A" 340 DRAW "BM20,100;"+A\$(X) 350 DRAW "BM120,100;U1;BU3;U2;R2 ; U5; L5; D2; " 360 B\$=INKEY\$ 370 IF B\$="" THEN 360 380 IF X=1 AND B\$="4" **THEN 500** 390 IF X=2 AND B\$="3" **THEN 500** 400 IF X=3 AND B\$="1" **THEN 500** 410 IF X=4 AND B\$="2" **THEN 500** 420 IF X=5 AND B\$="2" THEN 500 430 IF X=6 AND B\$="4" THEN 500 440 IF X=7 AND B\$="1" THEN 500 450 IF X=8 AND B\$="3" THEN 500

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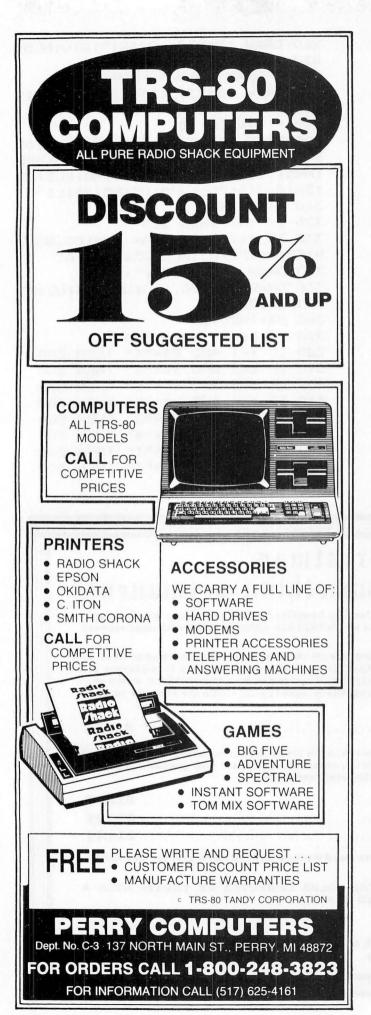
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January 1984 the RAINBOW 213



460 ' WRONG ANSWER 470 SOUND 20,20 480 GOTO 360 490 ' RIGHT ANSWER 500 FOR Z=150 TO 200 STEP 10 510 SOUND Z.1 520 NEXT Z 530 ' DRAW SUBJECT 540 DRAW "BM20, 100; C4; "+A\$(X) 550 ' DRAW QUESTION MARK 560 DRAW "BM100,80;U8;E2;R1;F2;D 3: NL5: D5: " 570 DRAW "C1:" 580 Y=X 590 GOTO 310 600 ' "PURPLE" 610 A\$(1)="U10;R5;D5;L5;BR10;BU5 ; D10; R5; U10; BR5; ND10; R5; D5; L5; F5 ; BR5; U10; R5; D5; L5; BR10; BU5; D10; R 5; BR5; NR5; U5; NR5; U5; R5" 620 ' "BLUE" 630 A\$(2)="U10;R3;F2;D3;NL5;D3;G 2; NL3; BR7; NU10; R5; BR5; NU10; R5; U1 0; BR5; NR5; D5; NR5; D5; R5" 640 " "GREEN" 450 A\$(3)="U10;R5;BD5;NL1;D5;NL5 ; BR5; U10; R5; D5; L5; F5; BR5; NR5; U5; NR5; U5; R5; BR5; NR5; D5; NR5; D5; R5; B R5;U10;F10;U10" 660 ' "YELLOW" 670 A\$(4)="BU10; F5; NE5; D5; BR7; NR 5; U5; NR5; U5; R5; BR5; D10; R5; BR5; NU 10; R5; BR5; U10; R5; D10; NL5; BR5; NU1 0; E5; F5; U10" 680 ' "SQUARE"

690 A\$(5)="R5;U5;L5;U5;R5;BR5;ND 10;R5;D10;NL5;NH2;BR5;NU10;R5;NU 10;BR5;U8;E2;R1;F2;D3;NL5;D5;BR5 ;U10;R5;D5;L5;F5;BR5;NR5;U5;NR5; U5;R5;"

700 ' "RECTANGLE"

710 A\$(6)="U10;R5;D5;L5;F5;BR5;N R5;U5;NR5;U5;R5;BR5;D10;NR5;BU10 ;R5;BR5;R5;BL3;D10;BR8;U8;E2;R1; F2;D3;NL5;D5;BR5;U10;F10;U10;BR5 ;NR5;D10;R5;NU5;BR5;NU10;R5;BR5; NR5;U5;NR5;U5;R5;"

720 ' "CIRCLE"

730 A\$(7)="NR5;U10;R5;BR5;D10;BR 5;U10;R5;D5;L5;F5;BR5;NR5;U10;R5 ;BR5;D10;R5;BR5;NR5;U5;NR5;U5;R5 ;"

740 ' "TRIANGLE"

750 A\$(8)="BU10;R5;BL3;D10;BR8;U 10;R5;D5;L5;F5;BR5;NU10;BR5;U8;E 2;R1;F2;D3;NL5;D5;BR5;U10;F10;U1 0;BR5;NR5;D10;R5;NU5;BR5;NU10;R5 ;BR5;NR5;U5;NR5;U5;R5;" 760 RETURN

Welcone to BASIG

By Richard A. White Rainbow Contributing Editor

kay, all of you who have been reading "Bits and Bytes" for three, six or even 12 months be advised I am speaking to new owners in this issue. The January Rainbow has, with good reason, been dubbed the beginner's issue. Computers sell as gift items at Christmas. We would hope that a few of these new owners will find the Rainbow on a newsstand and be reading this now. And with the warm weather over in the northern climates and school well underway everywhere, people move to indoor activities which may include purchase of a personal computer. So, better to include all who have had their CoCos only a few months in my target audience.

Owning a complex machine like a computer is both an exciting and a frustrating experience. Even the simplest program that works gives the new owner a feeling of power and accomplishment. The frustration comes in trying to do something that you should be able to do if you only knew how. Of course, your way is easier than mine was three years ago in that you can shop through nearly two hundred pages of advertising in the Rainbow for programs and hardware. I had a 4K machine, a Radio Shack manual, and little else. And the manual was not complete. Information on data files and much of the machine language information in the current Color BASIC Manual was not included. Needless to say, I spent some time and gasoline to find some books and magazines that told me enough about other computers that I could make my CoCo do what I wanted. And I sat at the keyboard and tried things.

When you or I type at the keyboard, we are trying to talk to our computer in a language call BASIC. A beginner trying to talk to a computer is like a baby trying to talk to its parents, yet different. The child makes sounds and looks for a response. You type characters and look for a response. If you type the wrong thing you will get an error response which is a colder thing than the child will get, but it still carries information that you will store away to use later. What is this language that you are trying to type?

The BASIC language was devised as an instructional language at Dartmouth College in the mid '60s. It differed from other languages and still differs in that it is interpreted and uses memory in an economical manner. Education has never been rich and memory then was expensive. BASIC is what is called a high level language. In a high level language, you

(Richard White has a long background with microcomputers and specializes in BASIC programming. With Don Dollberg, he is the author of the TIMS data base management program.) program using words and equations which are similar to the language you talk and write or were taught in math classes. Yes, there are differences from English or algebra and there are specific rules which will be new to you and which must be followed. Still, a high level language is much easier to learn and use than the numbers which the microprocessor understands.

A programming language is a program that converts statements that people can understand to numbers that the microprocessor in the computer can understand. The language does other things for you like storing and recovering data. If you have a program to help balance your checkbook, you probably enter the starting balance, check numbers, dates and amounts and the computer calculates your balance as you go. How does the computer keep track of all this information you have given it? It stores the data in memory either in an area called the variable table, if the data is a number, or in an area called string space, if the data is a series of characters like a name or a date. Each piece of data is assigned to a variable name by your BASIC program and the BASIC Interpreter program handles things from there.

If BASIC is a high level language, what is a low level language? Your 6809 microprocessor understands numbers which tell it to do certain tasks. Two- and three-letter abbreviations called mnemonics have been associated with these number commands. These can be used to write an "assembly language" program that is run through an assembler program to produce machine language, the numbers that the microprocessor understands. Assembly is a low-level language where the programmer tells the micro step by step what to do, like where to go to get data bytes, what to do to these bytes and what to do with the results. The assembly language programmer must know far more about his machine than does the BASIC programmer. A machine language program produces very fast operation coupled with economical memory usage.

There are many high level languages other than BASIC. Typically these languages will "compile" the program to machine language. This process is similar to assembly, but is far more complex. In both cases the program text must be converted by another program before it can be run in the computer.

Since you have BASIC in your CoCo, it is the natural first language to learn. The manuals that come with your machine are very good at teaching basic BASIC. This includes the syntax and a few uses for each of the statements, commands, functions, operators and special features of the language. But, manuals cannot teach all the ways BASIC can

be used to solve programming problems. Unless execution speed is crucial, BASIC will handle a surprising number of your program needs.

The techniques necessary to do some things are not always apparent. The beginner will quickly understand storing numbers in variables. Storing numbers in strings of characters is not an immediately obvious thing to do, though major savings in memory space with only modest loss of speed can be realized. In most cases, techniques like this are not learned from manuals, but from study of programs written by others. Typing programs in from the Rainbow is a fine way to learn these techniques and to become more comfortable with BASIC. You cannot type in a program without thinking about what you are typing and as you think, you learn. In articles like "Bits and Bytes," writers seek to present approaches that they have found successful from their experiences. The focus is on ways to program rather than details of syntax though these will be covered in passing. Some of these ways are very personal in that the programmer has been comfortable with a particular approach to a particular type of problem and will recommend that approach over others. A case in point is my dislike for DATA statements where the data is going to be read into variables in the program.

One of the first things to talk about is program organization. In the manuals and in many programs, the approach is very straightforward. Start with Line 10 and number lines at 10-line intervals until you reach the end of the program. This is fine for simple, top to bottom programs like the simpler ones in the manuals.

As you get into more complex programs with a number of functions and subroutines that you develop at different, times confusion can develop easily. Code may not work and

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1000 S. DIXIE HWY. W. #3 POMPANO BEACH, FLORIDA 33060 TLX. 514365 305-785-2002 need changing, added lines may need to be interspersed and that pretty 10-line spacing is lost. If you RENUMber, the code in higher line numbers is relocated and you have to search for it when you want to work on it again. There are better ways and I laid out my way a year ago when we started "Bits and Bytes." With so many new readers, I will give it again.

Perhaps the secret to programming is to "divide and conquer." Perhaps? Nay, it's a certainty. If you think of your programs as functional little pieces you will do a lot better. Pascal, another programming language, was written for use in teaching programmers to structure their programs. In fact, you cannot write in Pascal without adhering to strict structural rules. In BASIC, you have a choice of writing free spirited spaghetti-like programs or relatively structured ones.

Reading a "spaghetti" program is rather like reading an upside down roadmap under a new moon at midnight. New programmers seldom know where they are going with a program and, halfway through, may get bogged down figuring where they have been as well. Such is part of the learning process, so don't lose heart.

Program structure means program organization. Some languages require that variables, files, data structures and other attributes be declared at the beginning. Generous use of REMarks is encouraged and specific indentation formats are strongly suggested. Structuring also deals with what should be in subroutines, what should be in the main proceedure and how the procedures flow. Much of this is optional in BASIC; some is just good practice in any language.

Clarity should be as important a goal in BASIC as it is in other languages. There are a number of ways to write clear programs. I use the procedures that follow and find them valuable.

- 1) Define specific program functions and put the code for each function in its own module with introductory *REMs*. Assign a specific set of lines to a module. Blocks of 100 lines are convenient and will meet most needs. You will always know a module begins at an even hundred and can go right to the one you want.
- 2) Minimize looping back. The procedure should flow from start to end and loop only to repeat the routine or a portion of it.
- 3) Use *IF* . . . *THEN* . . . *ELSE* to minimize jumping forward. Many times all the code for the choices can be contained after *THEN* and *ELSE* on one line so that the procedure can continue on the next line. Some BASIC's don't have *ELSE*. Apple doesn't, and Apple owners pay extra for the lack. To illustrate, which is clearer to you?
 - 10 IF X=0 THEN PRINT "FALSE":X=1 ELSE PRINT "TRUE"
 - 20 END

or

- 10 IF X=0 THEN 30
- 20 PRINT"TRUE": X=1: GOTO40
- 30 PRINT"FALSE"
- 40 END
- 4) Put all subroutines in one of two places. Frequently called subroutines which include those that affect program speed should be at the front of the program. I reserve Lines 5 to 99 for these. These should not be more than three or four lines. Line number spacing of two is good.

Putting these here serves two functions. First the computer finds them quickly when speed counts. You also save bytes since the number in the *GOSUB* is only one or two bytes long. Infrequently called routines, particularly program initialization code should be at the end of the program. Each time a subroutine is called or the computer is sent to a specific line, it starts at the beginning of the program and searches until it finds that line. The fewer lines it passes to find the needed line the faster the search will be.

It follows that speed is compromised if the computer is continually searching over code it has used and will not use again. Clarity comes from having only two places to look for

"Owning a complex machine like a computer is both an exciting and a frustrating experience. Even the simplest program that works gives the new owner a feeling of power and accomplishment."

subroutines. The one exception that I make is to place a major subroutine at the end of the module that calls it when only that module uses it.

5) The same reasoning used above also applies to the ordering of main program modules provided they are called separately. Those used most frequently are put in front of the occasionally used ones. In a file program, the input module is used far more than the save to tape module and should come to the front. Modules that are used in order

should be placed in order in the program.

6) Menus should be placed where they are used in the program. A menu's text provides valuable information on the branching of the program that follows. If menu choices are numbered from one up in sequence, the *ON* 1 *GOTO* XXX,YYY,ZZZ or *ON* 1 *GOSUB* XXX,YYY,ZZZ commands can be used. It is easy to read a listing, see which number corresponds to the code block you want and then drop down to the *ON* I statement and count across to find the target line number.

Memory conservation sometimes forces use of strings defined elsewhere in the program in menu text. When this is done the advantage of reading the menu code to know what options are there and where to go for their code is lost.

Programming is a series of compromises. It is up to you to know what your options are and to make sure that your choices are educated ones and not guesses or blind repetition of past practices.

Though I have discussed program structuring for purposes of easy trouble shooting and modification, the structure proposed had program speed firmly in mind as well. Memory use was another consideration. Clarity, memory and speed are like three corners of a triangle. You cannot be at all three points at once. You can make choices that shorten the sides of the triangle and get close to where you want to be. It takes careful thought and planning at the start so you don't end up redoing too much.

Don't be upset when you don't get what you want the first or second time. Remember all good commercial programs have version numbers and Version 1.0 is the first one offered for sale, not the first one of the development process.

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By Captain Eighty (a.k.a. Bob Liddil)

In the wintertime, I like to sleep late. Max knows this and usually doesn't bother me. Max, for those of you who don't know, is a sentient computer program and the only one who knows how to use all the prototype gadgets that Professor Megabyte left in the attic lab of the house I live in. He left behind Max and a gadget called a DDS (short for

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Dimensional Download System), which can download a human into the world of computer software. Personally, I wish Max *didn't* know how to operate that thing.

It is disconcerting to go to sleep in a nice, warm waterbed in winter-bound New Hampshire and wake up the next day in the Old Programs' home guestroom in Programworld. I recognized the room because I've been here before.

Programworld is a dimensional subdivision where individual units of software are born, grow strong, grow old and retire. Old programs never die. They take their software social security and go to live in bulletin boards as downloads or they retire to the Old Programs' home.

I dressed in the tuxedo provided in my wardrobe. I learned long ago the futility of resisting my environment when downloaded. I had just put on my top hat and adjusted my tie when my escorts, two programs in training, arrived to take me to see the head honcho.

My host turned out to be none other than Grandfather Adventure, the original collossal cave adventure, written lo these many years ago on the mainframes, and elected to be governor of Programworld two years previously. It seemed, they told me, that I'd been invited to a wedding.

The bride was an unknown but brilliant arcade-style game. The groom was the very successful and popular Adventure game. It was like a scene from a bad movie with the friends and relatives of the bride, all popular or retired arcade games, sitting on one side of the room while friends and relatives of the groom, all traditional Adventure games, sat on the other. Each group glared at the other; there was much anger and hostility between them.

I saw many programs I knew as I made my way down the center aisle to take my place next to Grandfather Adventure and Pong, senior arcade game in the community. These two old duffers seemed to be taking the event well, although no one else appeared too happy at all.

The ceremony progressed speedily until they got to the

(Bob Liddil, Captain Eighty, is a well-known writer on Color Computer topics who has numerous columns and several books to his credit.)

Signature

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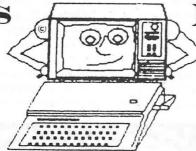
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part where the groom was instructed to "kiss the bride." At that point, things got weird. He took her into his arms and kissed her, whereupon they were both engulfed in a brilliant blue glow. The light grew brighter and the two programs within grew blurred and indistinct until I could not tell one from the other. When the light cleared and faded, there was only one program to be seen.

"It is with great pleasure," said Grandfather Adventure, addressing the group, "I present to you, the best of our two families, molded together into a single superprogram."

He paused dramatically, then gestured toward the new program still bathed in fading light.

"I give you the new Calixto Island!" He finished. The applause was thunderous. Programs began spilling out of their seats and into the aisles slapping each other on the backs and congratulating each other.

The party that followed was a real blowout.

Calixto Island (Illustrated) is indeed the wedding of two exciting and often clashing genres of commercial software. It combines the brainfare and verbal skills required of the Adventure player with the brilliant, often animation-quality graphics techniques found in the best arcade games.

The beginning of the game finds us in a three-room scenario with an attic, a cellar and a living room depicted in complex high resolution compu-photographs. The swinging pendulum of the living room clock adds motion to what already is a stunningly detailed screen. There are tasks to perform, clues to decipher and the beginning of a puzzle sure to take anywhere from weeks to months to solve.

Overall, I viewed many more locations and complexities than I can outline without giving away plot or vital clues. Rest assured that enough pure Adventure exists here side by side with brilliant graphic enhancement to convert even an ardent text-adventure fan like myself. I like this one a lot.

Mark Data Products has always been a source of excellent computer software products. Calixto Island was a hit in its original form. Now, in its pictorial edition, this excellent Adventure joins the disk-based illustrated compunovels which have already made a market splash and cover a unique segment of consumer computerists by being tape-based, wholly contained in memory.

Retailers will appreciate the no-nonsense packaging offered here. It is a colorful blister pak, easy to store and display. The consumer, always well-treated by Mark Data, will appreciate the attention to detail, lavishly and lovingly supplied by both the story programmers and the illustrators.

If this is an example of Mark Data products and their commercial philosophy, then strike up the band! They're giving more value than cash received.

I slipped away from the party after about an hour and went to the conference room where I knew I would be most likely to be able to contact Max. I'd already given my best wishes to the new Adventure and thanks to my hosts. Now it was time to go.

Sure enough, Max had been standing by waiting for me. The upload was painless and without incident. Hmmm, maybe he is getting the hang of this DDS stuff.

Once back in the lab, I found a pleasant surprise. Calixto Island had been loaded into the Color Computer in my absence. I can see out the window that it is beginning to snow. What better way to spend the day than playing this new and interesting game.

Sometimes having Max around is not so bad.

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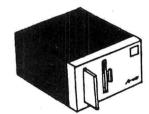
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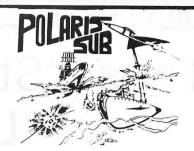
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Those 'Strange-Looking' Listings

By D.S. Lewandowski
Rainbow Contributing Editor

his month's issue is dedicated to the beginner. I'm sure we have a lot of new owners since the visit of the Red Elf. We would like to welcome them to fellow ownership of the finest home computer available. Since the main topic of this series is Assembly Language we will try to explain the strange looking listings you will find in magazines.

As for you *old timers* (doesn't that sound nice!), I have to explain a little problem I have been trying to rectify. The final part of *Text* was indeed complete, however the files were destroyed. I had to wait for *the Rainbow* to come out to just catch up to the point where you are. Since you never write a program the same way twice I have been trying to finish it again since. As soon as I do, it shall be here, thanks for your patience.

First off we should start by telling you that assembly language and machine language are different. Assembly language involves the use of an Editor/Assembler. The Editor is the means of entering text, similar to a word processor. The text is used by the Assembler to form a machine language program. The text used by an Assembler is called source code. The program formed by the Assembler is called either a machine language program, or binary code.

You will hear some people say that they wrote a program in machine language, which could be true, however most of the time they wrote the program in assembly language. Now to confuse matters evem more, most Editor/Assemblers have a monitor (which is nothing like a TV). A monitor is a machine language program provided to allow the user to debug, or at least look at, the machine language program once it is assembled.

To write in assembly language you will need an Editor/Assembler package. The two I prefer, and can recommend are: EDTASM+ by Microsoft, sold by Radio Shack; and SDS80C, or MACRO 80C (Disk version) sold by Micro Works. Both packages are well written, fairly easy to use, and almost totally debugged. Probably 99 percent of the time when you see a listing in source code it will have been written by one of these packages. There are a couple of minor differences between them, and both have one major drawback, which we shall attempt to rectify here.

The drawback is that both packages "assume" that you

(Dennis Lewandowski, one of the early authors active with the Color Computer, specializes in machine language programming. He and his wife, Rose, founded DSL Computer Products.)

know how to operate them. The instruction manuals for both fall into the classification of "fair" reference material.

There is a book available through Radio Shack called Color Computer Assembly Language Programming by W. Barden, Jr. It is very good, however it was written about two years ago, and certain examples won't work with the newer machines. (See, you were doing it right!) Don't blame Radio Shack, or the author, it was just a problem with publishers, and other technical things that go into getting a book on the shelves. I still strongly recommend it.

Okay, enough background, let's get into how do I use this \$50 up package? I'll assume your a complete novice. So insert your ROM pack, or load the program from disk. By the way never, never, insert a ROM pack with your computer powered up. It will "kill" your computer, it says so in your owner's manual, and with every ROM pack you purchase. Okay, once the program is executed (which means running—you don't have to take the computer to the wall each time and offer a blindfold), you find yourself in the command mode, this means the program is waiting for a command from you. Since we just started there is no text in the computer, so we enter the command "I" for insert text. The EDTASM+ will give you a line number, SDS80C will not, but will print LINE INSERT across the top of the screen. Easy young Jedi, let's explain that there are four columns availble to you at this point. Pressing the right arrow will move you into the second column. Each time you enter the insert mode, or press enter you will be in the first column

Each column has its own special function. The first column is for labels. These labels are used similar to line numbers in a BASIC program, don't confuse the line numbers in EDTASM+ with BASIC line numbers. These numbers are just for editing. The second column is for the instruction. The instruction, or action of the line, is also called the mnemonic, op-code, and operation code. No matter, they all refer to the same column. The third column is used for data, it can be a number, a register, a string of text, or blank, this depends on what is in the instruction column. The fourth column is used for comments, this column's use is optional. You would use comments to remind yourself, or tell another reading your code, what the line is doing. Again you press the right arrow key to get to the next column in each line. Once you have finished entering the text you complete the line by pressing [ENTER]. This automatically puts you into the next line of text, similar to automatic line numbering. To exit the insert mode you have to press [BREAK,] which will bring you back to command mode.

Okay, let's write a program, assemble it, and execute it. In this program you will see three instruction which are to aid you, they are [T], [E], [B]. [T] means tab, or press the right arrow key. [E] means press the [ENTER] key. [B] means press the [BREAK] key. Do not type in these instructions, which are indicated in brackets, as you type in the following:

\$E00 [E]

CLS0 [E]

[-]	[-]	
JOYSTK [T]	JSR [T]	\$A00A [E]
[T]	LDA [T]	\$15A [E]
[T]	STA [T]	RLVAL [E]
[T]	LDA [T]	\$15B [E]
[T]	STA [T]	UDVAL [E]
[T]	LDA [T]	\$FF00 [E]
[T]	CMPA [T]	#\$7E [E]
[T]	BEQ [T]	CLS0 [E]
[T]	LDA [T]	UDVAL [E]
[Τ]	ASRA [E]	
[T]	ASRA [E]	
[Τ]	LDB [T]	#\$20 [E]
[T]	MUL [E]	
[T]	ADDD [T]	#\$400 [E]
[T]	TFR [T]	$D,X \stackrel{\cdot}{[E]}$
[T]	LDB [T]	RLVAL [E]
[T]	ASRA [E]	2 1
[Τ]	ABX [E]	
[T]	LDA [T]	#\$FF [E]
[T]	CMPX [T]	#\$5FF [E]
ŢΊ	BGT [T]	FIXX [E]
STORE [T]	STA [T]	,X [E]
[-]	Land J	, LJ

ORG [T]

BSR [T]

START [T]

[T]	BRA [T]	JOYSTK [E]
CLS0 [T]	LDX [T]	#\$400 [E]
[T]	LDA [T]	#\$80 [E]
LOOP [T]	STA [T]	,X+ [E]
[T]	CMPX [T]	#\$600 [E]
[T]	BNE [T]	LOOP [E]
[T]	BRA [T]	JOYSTK [E]
FIXX [T]	LDX [T]	#\$5FF [E]
[T]	BRA [T]	STORE [E]
RLVAL [T]	FCB [T]	0 [E]
UDVAL [T]	FCB [T]	0 [E]
[T]	END [T]	START [E]
[B]		

If you typed in the above correctly, you are ready to Assemble the program. But, before we assemble it, let's save it on tape. If you have a disk system, read the instructions which came with your Editor/Assembler to save your file except for MACRO-80C. To save the text, or source code, enter the command W JOYTEST (E) for EDTASM+. Press [W] then enter "JOYTEST" for SDS80C. To Assemble, you have to know how to get the assembler to operate. For EDTASM+ enter the following commands, A/WE/IM[E]. For SDS80C press the [@] amphere key, then press "M"[E]. For MACRO-80C press the [BREAK] key, it will ask if your done, answer "Y" for yes. Then save the text to Disk. The Assembler is a different program, so you have to RUN "ASSEM."

Whichever of the three ways you do it you have assembled the text into a machine language progam. The program exists in two places, first in text in your Editor, second in

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PEACOCK ENT. 194 CANNONGATE III ROAD NASHUA, NH 03063 603-880-8169 Mon-Sat 10-10 memory as a binary set of instructions. Hopefully you also have the text in a third place: tape or disk. If you got an error while assembler was working, it is a typing error. There is no possible way an assembler can check for programming errors, it will allow you to write anything as long as you follow its syntax.

Okay, let's assume everything has gone fine. To execute the program do the following for your package. EDTASM+ type Z [E] then GSTART [E]. For SDS80C you will be in ABUG, just type G [E]. For the disk jockeys you have to LOADM "JOYTEST" then EXEC [E]. The program is simple enough just move the left joystick around, and the screen traces it in orange. Pressing the fire button clears the screen to black. The program is a loop, so you must press the reset button, on the back of your computer to exit.

Finally, to make a machine language program, so you don't need to have the ROM pack in while running this program, follow these steps. EDTASM+ - type A JOY-TEST [E]. SDS80C press [@] then type T JOYTEST [E]. MACRO 80C creates the machine language file from the text file during assembly. Well that's all for this month, hope you enjoyed your little trip into assembly language. If you would like some more info, check Rainbow Technical Editor Dan Downard's article in this issue and/or send either a 37¢ stamp, or two 20¢ stamps to DSL Computer Products, P.O. Box 1113, Dearborn, Mich., 48121, for a booklet called Using An Editor/ Assembler.

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0E00	8D	34	00120	START	BSR	CLSO	TURN SCREEN BLACK
0E02	AD	9F A00A	00130	JOYSTK	JSR	[\$000A]	SAMPLE JOYSTICK
			00140	+USE SH	IFT DOWN	ARROW &	SHIFT RIGHT ARROW FOR BRACKETS
0E06	B6	015A	00150		LDA	\$15A	RIGHT/LEFT VALUE
0E09	B7	0E49	00160		STA	RLVAL	SAVE VALUE
OEOC	B6	015B	00170		LDA	\$15B	UP/DOWN VALUE
0E0F	B7	0E4A	00180		STA	UDVAL	SAVE VALUE
0E12	B6	FF00	00190		LDA	\$FF00	CHECK FOR FIRE BUTTON
0E15	81	7E	00200		CMPA	\$\$7E	PRESSED?
0E17	27	1D	00210		BEQ	CLSO	IF SO CLEAR SCREEN
			00220	₽THIS 6	ETS SCRE	EN LINE	1 THRU 16
0E19	B6	0E4A	00230		LDA	UDVAL	BET VALUE
OEIC	47		00240		ASRA		DIVIDE BY 2
OEID	47		00250		ASRA		DIVIDE BY 2 AGAIN
0E1E	63	20	00260		LDB	#\$20	PUT HEX 20 IN B
0E20	3D		00270		MUL		MULTIPLY A+B
0E21	C3	0400	00280		ADDD	#\$400	ADD SCREEN OFFSET
			00290	+BY THE	WAY A+B	=D. A =	THE FIRST HALF, B = SECOND HALF
0E24	1F	01	00300		TFR	D, X	SAVE THE RESULT IN X
0E26	F6	0E49	00310		LDB	RLVAL	GET VALUE
0E29	57		00320		ASRB		DIVIDE BY 2
0E2A	3A		00330		ABX		ADD B TO VALUE IN X
0E2B	86	FF	00340	STORE	LDA	#\$FF	DRANGE GRAPHIC
0E2D	80	05FF	00350		CMPX	4\$5FF	SEE IF OFF SCREEN
0E30	2E	12	00360		BGT	FIXX	IF SO FIX X
0E32	A7	84	00370		STA	, X	PUT ON SCREEN
0E34	20	23	00380		BRA	JOYSTK	DO IT AGAIN
0E36	8E	0400	00390	CLS0	LDX	25400	START OF SCREEN
0E39	86	80	00400		LDA	#\$80	BLACK GRAPHIC
0E3B	A7	80	00410	LOOP	STA	, X+	STORE CONTENTS OF A
0E3D	38	0600	00420		CHPX	8\$600	END OF SCREEN +1
0E40	26	F9	00430		BNE	LOOP	KEEP BOING TILL DONE
0E42	20	BE	00440		BRA	JOYSTK	BACK TO TEST
0E44	8E	05FF	00450	FIXX	LDX	9\$5FF	BOTTOM OF SCREEN
0E47	20	E2	00460		BRA	STORE	BACK TO PROGRAM
0E49		00	00470	RLVAL	FCB	0	
0E4A		00	00480	UDVAL	FCB	0	
		0000	00490		END		
					-		

Back Issue Availability

Back copies of many issues of the RAINBOW are still available.

All back issues sell for the single issue cover price—which is \$2 for copies of Volume I, Numbers 1-8 (through February, 1982), \$2.50 for Volume I, Numbers 9, 10 and 12 (through June except May, 1982) and \$2.95 for Volume II, Numbers 9, 10, 11, 12 (March, April, June and July 1983). Also \$3.95 for Volume III, Numbers 3—6 (October 1983) through January 1984). In addition, there is a \$3.50 charge per order for postage and handling if sent by United Parcel Service and \$6 for orders sent U.S. Mail. UPS will not deliver to a post office box or to another country. This charge applies whether you want one back issue or all of them.

Most back issues are available on white paper in a reprint form. Issues out of print include May, July, August, September, October, November, and December, 1982 and January, February, April, 1983. VISA, Master Card and American Express accepted. Kentucky residents please add 5 percent state sales tax.

Due to heavy demand, we suggest you order back issues you want now while supplies last.

In addition, copies of the cover only of the July, 1982, Anniversary Issue are available separately for \$1 each, plus 50 cents shipping and handling. These are suitable for framing.

RAINBOW REVIEWS

Airline
A High Flying Strategy Game/Adventure International
Balloon Attack A Game But A Better Learning Tool/Computer Shack
Body Parts Demonstrates Artificial Intelligence/Elite Software
Bomber Command Simulates History/Ark Royal Games
Buzzard Bait
Tom Mix Flies Again/Tom Mix Software
Gives Total Control/Vidtron
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VIP Terminal Still A Super "Color" Terminal/Softlaw Corporation
Zeus Slockrift in a Action Declard Fun / Acedurals Limited 294

REVIEWS

VOICE-PAK

Editor:

The November issue of the Rainbow contained one review and one article on the speech products from Spectrum Projects. Both were very favorable but both conveyed a rather large misconception to your readership.

I am Frank Delargy, president of DEL Software and author of the speech programs that are sold with the Speetrum Voice-Pak and other speech synthesizers, including those from Speech Systems and Kelty

Engineering.

In his very favorable and much appreciated review of the Voice-Pak, Bruce Rothermel made a few statements that really should be explained more clearly. When Bruce wrote, "What makes the speech so understandable is a phonem dictionary . . . if a word is not in the dictionary, it reverts to the phonetic rules stored in the chip," a major error (from my point of view) was made. First, the Votrax chip has no rules whatsoever, stored in it. The sole function performed by the chip is to make a short noise when one of 64 codes is transmitted to it. It does not know how to pronounce anything. What really makes the computer pronounce words is about 5,000 bytes of 6809 code contained in the program TRNSLATE or TRNSLT16. There are over 500 separate rules and decisions that the program makes in order to translate English text into Votrax codes. These rules will accurately pronounce practically any word in the English language. When a word does not follow the rules it can be placed in the dictionary along with the proper pronunciation (in Votrax phonemes). The dictionary is, in essence, an exception table needed only for a very small percentage of the words you might wish to speak out. The word "one" is in the dictionary because it does not conform to the normal rules of English language pronunciation.

Frank Delargy DEL Software

FUNDFILE

Editor:

After reading the review of Fundfile in the November issue of Rainbow magazine. I felt compelled to comment on it. Fundfile is a computer program for use by investors for managing their stock and fund investments. The review of Fundfile by Ed Lowe appears to be a mismatch of reviewer and program. Mr. Lowe states in the review that he doesn't "happen" to have a portfolio of stocks and/or funds lying around" and he "thinks"

that money is safest under the mattress." He obviously doesn't need *Fundfile* to keep track of his investments.

We feel Mr. Lowe's comments on "the difficult to follow documentation" may be partly due to his unfamiliarity with the investment field, but we also recognize that porgram documentation is important and can generally be improved. We are rewriting the documentation so that novice investors will find it easier to follow and easier to use Fundfile (and its companion program, Fundgraf, which was reviewed favorably in January '83 Rainbow'). We expect to complete the rewriting by December.

R. E. Parsons, President Parsons Software

MOTORBIKE CHALLENGE

Editor:

After reading the software review of Motorbike Challenge by Pat Downard in the October issue of the Rainbow, I bought this game from Microcom Software. I fully agree with the review that it is a thrilling game for motorbike adventure lovers. My younger brother and I play and enjoy it a lot! We know that we can count on your judgment and review. Thank you for recommending this game for CoCo users. Keep up the good work!

Gary T. Jes Cincinnati, OH

THAT'S INTEREST-ING

Editor:

Mr. Parks' review of our interest programs (November '83) described a minor bug in the program. Although his description of the mechanism was quite inaccurate, we did find a problem which was triggered by an unexpected and unusual set of input parameters and did result in the indicated effect. Obviously, it has now been corrected.

Melvin Hefter Custom Software Engineering, Inc.

STATEMENT WRITER

Editor:

In Mr. Hogan's review of our Statement Writer program (December '83), he states, "The real power of both DDE[Double Disk Entry] and SW is the ability that has been designed into both programs for user modification." Statement Writer has been designed and documented to allow for easy user modification. We came up with a reasonable statement format for general use on

plain paper, but we also knew that many users would want to put in changes to accommodate preprinted forms or other special requirements. This was the reason for the "designed to change" concept.

But DDE is different. It does have its high level code in BASIC and a user proficient in BASIC could change this code if he desired, but DDE was not designed or documented with user change in mind. The user does set up the account structure (without any change to the program code) and this does drive the format and content of the standard accounting reports DDE generates. The user does customize the total system for his needs, but this is usually done without any changes to the DDE program itself.

Melvin Hefter Custom Software Engineering, Inc.

MATH FACT

Editor:

I'm a third-grade teacher and have used B-5's *Mathfact* program (September 1983, Page 202) I felt Rick Cobello overlooked some of the strengths of the program in his recent review.

First, the program contains a choice of addition, subtraction, multiplication and division facts, or a mixed presentation all in one program. This is a good value. This also allows the teacher/parent a choice of how to present the material.

Second, all the problems within the set are presented ensuring the student will receive practice on any problem with which he/she may need additional help. I have used programs where the facts appeared randomly and the student has never encountered the particular fact he needed to work on.

Third, the answer is not given if a fact is missed because the program branches back to the pictures of blocks. The students may count the blocks to determine the answer. Hopefully, this will help the student remember the answer longer and reinforce the mathematical concepts behind each operation. The next best thing to counting real blocks is counting a picture of blocks. Helping the child to discover the answer for himself is more educationally sound than merely giving the answer.

I also feel Mr. Cobello missed the point of the "Guess the Number" game at the end of the drill. The chance to play the game is the reward, not the winning of the game. Sidelearning is an additional benefit from the game when the child uses ideas of greater than, less than, and when the child approximates with reasoning to guess the number. I take exception to Mr. Cobell's comment that drill and practice programs should be left to paper and pencil unless the presentation is unique. I know of no paper and pencil program which branches back to symbolic pictures as soon as a student gives an incorrect response. Elementary students spend much of their time drilling and practicing. Why shouldn't they have the opportunity to enjoy practicing on a computer as well as paper and pencil?

In conclusion I have found *Mathfact* to be a worthwhile program. I'm glad I've had the

opportunity to use it.

Mrs. M. J. Burger Vermilion, OH

LOWRCASE

Editor:

By now you're probably aware of the great disservice done to your readers by Mr. Ed Lowe's review of our LOWRCASE program in the December issue of Rainbow. It would have been nice if he reviewed our program, but instead he reviewed the

LPVII DMP100 printers.

The reviewer first gave his opinion of the printer when he said he invested in a LPVII to have "some means of listing programs..." His opinion when he needed better quality characters was: "I simply saved my pennies" and bought a better printer. So why bother with the LPVII/DMP100; it's "not worth the effort"—I can't believe he means this. There are many LPVII owners that cannot afford to upgrade and would rather spend the \$15.95 for our program. The reviewer calls our program "too expensive," yet the price of our program is much less than another \$400 or so for a printer upgrade.

So, instead of a quality review with constructive criticism (there was none), the reviewer proceeds to give the mistaken impression to the readers that our program is no good. If this is the type of review that you approve of then we will not submit future programs for review, but will let them

sell on their own merits.

I hope that interested readers will contact us directly for the correct information about the LOWRCASE program; we would hate to see them do without true descenders because of this review. It is too late to fix the damage done by this review; but I will again ask for a review of our program, and not the LPVII/DMP100 printers. Thank you.

Ken Elder KRT Software

VOCABULARY BUILDER

Editor:

I would like to commend Steve Blyn from Computer Island on the articles he has submitted and the expressed care he has shown in preparing educational programs. I spent some time in preparing the review of the Vocabulary Builder program (September 1983) and agonized greatly over the somewhat negative tone which I was sure the review would carry. However, in my opinion, the criticisms were appropriate. Although not stated in the review, I did indeed

try the program with children. The opinions were, at best, mixed. In all fairness, the sample of children was very small and hardly constituted a fair test of opinions that might be expected and certainly did not constitute an adequate test of the program's effectiveness. I, therefore, chose not to include those opinions.

The main strength of the program would be the inclusion of a large amount of questions, provided there was a probability that content of the program was fully covered. I am in favor of using "random order of presentation" of questions (which was used by this program) and go one step further by stating that the order in which answers are presented should be random. Although the order of answer presentation may have been initially randomized, each time the same question appeared the same order of answers appears with this program. However, I do not feel that once a good representation of content is chosen, that the selection of which content is presented should be a random process. Such a method (as was used in this program) has the following effect.

 There is a good probability that most, if not all, students will not receive full cover-

age of the intended content.

2) There is an even better probability that the coverage of content across individuals will be uneven. Some individuals will receive greater exposure to a smaller number of items. Other individuals will receive a lesser exposure to a greater number of items. There is no "guarantee" that a specified number of questions will be repeated an some questions will be new. In fact, it is possible (assuming an adequate randomizing model is used) that some individuals could see only 50 items while others could see all 200 items.

I used a statistical model and computer generation to determine the number of words that would be unused for any specified number of trials and the Vocabulary Builder program. The computer generation procedure duplicates the number of words that would be exposed to 100 individuals who were given 10 trials with the program. The results of both methods were nearly identical. It would be expected that less than 75 percent of the total available words would be used after four trials with Vocabulary Builder. However, had the program been segmented into four equal parts of 50 words each, the entire content could be covered without a single repetition.

If repetition is desirable, then the segmented method could be repeated again. After eight trials, each individual could be exposed twice to all of the content. However, the method used by *Vocabulary Builder* does *not* guarantee this type of exposure. In eight trials (using the method employed in *Vocabulary Builder*), it is expected that less than 90 percent of the content would be covered for most individuals and certain individuals could be exposed to as little as 25 percent of the total content.

If I had considered this matter simply trivial, I would not have commented further on this review. I believe that several methods

that would employ full coverage of the content would offer a more efficient learning experience. Mr. Blyn has replied that memorizing of the position of an answer was a problem in field tests and, therefore, the method used was appropriate. However, the program does *not* randomize answer position across repetitions. Further, randomizing the order of question presentation (as well as answer position) is possible without sacrificing full coverage of content.

Mr. Blyn takes issue with a suggestion that the possible reduction of the amount of memory is an appropriate criticism. If a similar program proves to be more effective or even only equally effective, then the less memory required the better. Schools or parents with limited budgets could utilize the program on less expensive equipment. Perhaps the reduction from 32K to 4K would sacrifice more advantages than would be gained. However, by breaking the program into four programs consisting of 50 items each is viable for a 16K machine and in my view advisable.

I am not suggesting the inclusion of less vocabulary words in the total package, but rather that you consider alternative (perhaps less memory dependent) methods for presenting those words. Including four sets of 50 words (four separate programs on one tape) is one of many methods that could be used.

In relation to using an *INPUT* vs. an *INKEY* routine, Mr. Blyn offers some very valid arguments. I would still prefer the quicker pace that using a single key stroke would allow. Research appears to support quicker paced material over slower paced presentation. However, I could not state for certain that his would lead to more effective learning for this particular program. On the other hand, an *INKEY* routine does not negate the use of error correction. Consider the following routine:

10 X\$=INKEY\$: IF X\$=CHR\$(8) THEN A\$="":?@160," ":GOTO 10 ELSE IF A\$= CHR\$(13) THEN GOTO 20 ELSE IF X\$= >"A" AND A\$<"D"THEN A\$=X\$:?@160, A\$:GOTO 10 ELSE GOTO 10

20 REM THE ROUTINE TO CHECK FOR CORRECT ANSWERS GOES HERE

This routine allows for changing to an-

other answer or erasing an answer. The INPUT routine used in the Vocabulary Builder program allowed the input of information beyond the space provided for that answer, thus a student could erase part of the existing screen before pressing [ENTER]. The Rainbow sends a set of instructions to its reviewers. Reviewers are told to offer suggestions about how a program can be improved. I feel that suggestions for improvement for the Vocabulary Builder program are especially appropriate since the documentation invites the user to alter the program for their own uses. I think that, upon reflection, Mr. Blyn would agree that a discussion of programming techniques is appropriate for a review where such suggestions are aimed at improving the quality and usefulness of the product.

> Dr. Charles H. Santee Darien, IL

Programmer's Toolkit A Useful Assemblage

I recently received a tape of programs collectively called *The Programmer's Toolkit*. The toolkit consists of a series of six machine language programs, each designed to aid in the programmer's work. Of the six, I quickly settled on two programs which I found to be most useful.

The first is called CROSSREF. It is a cross-reference program which will go through a BASIC program and generate two cross-reference listings. The first contains all the numeric variables followed by all the string variables in alphabetical order. The number of every line in which each variable is used is printed next to the variable.

The second list contains all line numbers referenced by *GOTO* or *GOSUB* along with the number of each line containing the *GOTO* or *GOSUB*.

A nice feature of this program is that it tests for a printer being connected and ready. If one is, the lists are printed; otherwise they are displayed on the screen.

The first time I used this program, I thought something was wrong. When it began to EXECute, a sign-on message appeared and then the computer just sat there. As it turned

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*TANDY COTP

out, the program was generating the list and sorting it into sequence. Once that task was completed, the list printed at full printer speed. Actually, this program runs considerably faster than a similar program I saw on an IBM-PC!

The next program that I find myself using heavily is the one called EDIT. It is an editor for BASIC lines that is considerably easier to use than CoCo's own editor. Although it is called a "full screen" editor, it works on only one line at a time. Its features include full cursor control using the arrow keys, a very nice insert function, character delete and non-destructive backspace. A feature I like is the ability to copy a line somewhere else in the program by changing the line number. There is also auto-repeat on all keys.

EDIT also has a list feature that lists from some starting line number and fills one screen. To continue the listing simply hit [ENTER].

There are two weaknesses in EDIT. First, there is no enter mode as such. It can be used to enter a program but it was obviously not designed for it. The second weakness I consider to be a major deficiency—it will not add a line with a line number lower than the highest line number in the program. If you are editing a program and have to add an overlooked line of code you must exit EDIT, add the line through standard BASIC, and then return to EDIT.

The other four programs in the toolkit are nice to have but used less frequently than CROSSREF and EDIT.

The program called CMERGE merges two or more BASIC programs. The procedure uses a series of *PEEKs* and *POKEs* has been documented in these pages several times. In the toolkit we have a program to do all the work for us.

CHAINRUN is a mixed BASIC and machine language program that provides the capability of chaining from one program to the next—a feature of many disk systems but not previously available for CoCo cassette programs.

HEXEDIT allows the user to view and modify any memory location. A nice feature of HEXEDIT as compared to some other monitors I have seen is that it displays a block of locations in hex on the upper area of the display and the ASCII contents of those same locations in the lower half. This makes it particularly easy to pick out text-type data.

Finally, DUMP is a subset of HEXEDIT that only displays memory locations without any ability to change them.

The Programmer's Toolkit requires at least 16K but Extended BASIC is not required.

(Moreton Bay Software, 316 Castillo Street, Santa Barbara, CA 93101, \$28.95)

-James G. Kriz

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The VIP: Still A Super "Color" Terminal

By Jim Reed

When Tom Nelson asked me a few weeks ago why the Rainbow had never reviewed VIP Terminal (formerly known as Super "Color" Terminal), I told him I was quite sure we had; he just must have missed it. After all, it is one of the Rainbow's work tools. We use it every day.

On hanging up the phone I grabbed an index and searched; I couldn't find a review. Well, any of us here at the Rainbow could review this old friend. I suppose that omission of a review on this first-rate piece of software is sort of like not seeing your glasses because you have them on. Anyway, this excellent utility deserves its due, so let's remedy that, pronto.

The VIP Terminal. I've gone through a lot of changes with this benchmark of terminal programs: introduced to it as a tape program, learned to trust it as a ROM pack, and grown to rely on it as my single, most often used disk utility.

The VIP Terminal is one of several "intelligent" terminal programs on the market. Intelligent terminal programs are those that have such features as uploading and downloading, printing out the buffer, saving the buffer—that do what the "dumb" terminal you bought you know where won't do. If you have a modem and intend to communicate with other computers, you need an intelligent terminal program like VIP Terminal.

VIP Terminal has all the features needed to engage in data communication. Yes, some other programs now on the market may have a bell or whistle that this veteran doesn't, but the VIP Terminal is loaded with features and has everything you need to communicate with most any computer or microcomputer with RS-232 capabilities. It can handle any type of text in any system.

When you load in *VIP Terminal* from disk, it automatically checks to see how much memory your computer has and will allocate buffer space accordingly—up to 51K (if you have 64K and don't use the Hi-Res format which requires 7K itself). Among its features, the *VIP Terminal* has:

—Selectable screen formats, 32 by 16, and 51, 64 or 85 columns by either 21 or 24 lines (for a total of nine display sizes). While several of my friends and associates prefer the 51 by 24 display, I like the more familiar 32 by 16 because it scrolls more quickly (the extra processing time for the Hi-Res software routines makes them slower than the standard 32 by 16 display that is built right into the CoCo's hardware) and the print is much larger. An added feature of any of the Hi-Res modes, though, is true lowercase instead of inverse video. Additionally, the 64-column mode offers a choice of wide or narrow character sets. One note: the 85-column mode is very hard to read and should be considered only a formatting screen.

—Four display color choices (except in 16K). In the 32 by 16 mode, you can have either a green or an orange background. In the Hi-Res modes, your color options are black characters on either a green or a white background, or green or white characters on a dark background (inverse video).

-Word wrap-around. If an entire word won't fit at the end of a given line, it is automatically moved down to the

next line. Most of us take this feature for granted, but how primative it would feel now not to have it.

Graphics support. Yes, you can receive, and send, pictures as well as text.

—Modified parameters. While, for many uses, you may not need to change the RS-232 protocol, there are many times you may require non-standard parameters—for instance, when I need to send something directly from the CoCo to the Rainbow's typesetting computer. On loading VIP Terminal, the parameters are initialized for the most common protocol and if you are in doubt when changing parameters, hitting [ENTER] usually will cause the program to default to the most often used value for that given parameter.

—Buffer display and/or printout. It's nice to be able to page through the buffer's contents, first to satisfy yourself that you have what you're after by actually seeing the contents on the display screen, and also to pass by any large blocks you don't want to print out. Since I frequently load substantial material into the buffer and usually only want to print out a small portion, this is useful. It would be even handier, though, if I could write to and edit the buffer without having to transfer the contents to a word-processing program. Maybe a primitive editor could be added.

—Keystroke multipliers (KSMs). Keystroke multipliers—or should we call them keystroke reducers—allow you to create and edit up to 10 short messages which can then be sent with just two keystrokes. The messages can be as long as 255 characters. Not only are these useful for repetitive phrases, but you feel more like you've harnessed a bit of computer power when you press, say, [CLEAR] [2] and your BBS I.D. number slides onto the screen in answer to a host computer inquiry. Then [CLEAR] [3], and your password is sent, too.

—Disk commands. VIP Terminal allows you to load, save, rename, change default name, kill a file, and display disk directory. All of these commands are similar to those in the Radio Shack DOS, but VIP's directory command also shows the number of free granules available and an asterisk will denote any faulty disk that should not be written to. VIP Terminal's mini disk operating system is also used in other VIP Library programs.

There are several other features, such as Xon/Xoff, lowercase masking and selectable trapping that make the VIP Terminal highly versatile, whether you are receiving information or transferring it to another computer, downloading or uploading BASIC programs, transmitting or receiving binary files, using intelligent modems, communicating between two Color Computers, or even communicating with a dumb terminal. In my opinion, the 33-pages of instructions in the handsome binder is one of the best examples of good documentation you're likely to come across.

The VIP Terminal. I recommend it without reservation as a quality product. In the times I've used it, I've had only one problem: I did encounter some trouble handling ASCII files when using an earlier version, but that problem has been solved with the latest version.

VIP Terminal is both user-friendly and thoroughly professional. Dan Nelson is clearly a top-rate programmer and Tom Nelson's expertise also shines through the well-written operator's manual. The VIP Terminal is still a super color terminal.

(Softlaw Corp., 9072 Lyndale Avenue South, Minneapolis, MN 55420, Disk or ROM pack, \$49.95)

Panic Button— Ah, What Sweet Revenge

It was finally my chance to do something I've always wanted to do to just about every boss I've ever had—throw a cake in his face. All that pent up aggression raced through my fingertips as I slung that messy cake . . . and he didn't even duck! He asked for it though, screaming at me to move quickly as I assembled robots, cakes, houses, televisions, lamps and telephones on his speedy conveyor belt.

If you like a Hi-Res graphics game filled with race-against-the-clock action, *Panic Button* is for you. In this 16K ECB game, your boss wants an order fully assembled and filled immediately or you are fired! In the beginning of the game, you choose which objects you wish to assemble, thus picking the desired skill level. The higher the skill level, the faster the conveyor belt moves.

Each object is dropped onto a moving conveyor belt in three pieces. Using your joystick, you must manuever your worker next to each piece and, by pressing the button, pick up and drop the three pieces on top of one another in proper sequence to make a complete object. Each piece or complete object moves along the conveyor belt to the bottom of the screen. You will get credit for each completed object that exits the screen.

To progress to the next skill/object level, you must assemble at least as many as the order requires in two minutes. After successfully completing two consecutive levels, you are given the exciting and well deserved chance to

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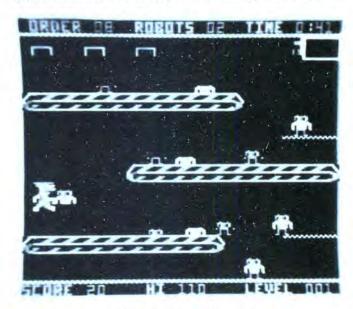
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FILEBOX/16 © 1983 by Luke Watson TRS-80 is a trademark of the Tandy Corp throw a cake at the nasty boss' face.

Sound easy? Precision, timing and dexterity are keys to the game. Once you break stride and the orders start passing you by, you quickly panic. Suddenly, pieces of unfinished objects fly around the screen, distracting you from completing your task. Some pieces will hit you in the head, while others just interfere with the production process. When you feel the tension build, maneuver your worker up and down over the Panic Button on the screen while you push the joystick button. The conveyor belt will stop for a brief time



so you can assemble incomplete objects. But, the conveyor belt will begin moving again and your ugly boss' face will appear, making an annoying, grumbling noise. No doubt, it's a warning to get your butt in gear.

Panic Button provides colorful graphics, good sound and adequate instructions. The screen not only provides you with game play, but shows you how many orders you are required to complete, how many you have completed, the time and the Panic Button. At the bottom of the screen your score, skill level and highest score appear. The sound effects are a good adaptation of what each action really sounds like. For instance, when a piece of an object drops from the top of the screen onto the conveyor belt, a dropping "boop" sound is made.

The hardest skill to master is maneuvering your worker next to a piece and placing it on another. You usually get cake toppings or robot feet on your head as you run up and down the conveyor belt. I'm sure that gives the boss a hearty laugh.

One of the best features of *Panic Button* is that it is addictive. After the screen says "You are fired," you find yourself pushing the joystick button to play another round—especially if you have almost completed two rounds and have just missed the chance to throw that cake. The only aggravating part is, you must start from the beginning and, again, successfully complete two levels.

I thoroughly enjoyed *Panic Button* and think it is well worth the price. I recommend it to anyone who enjoys action-packed fun and sweet revenge.

(First Star Software, Inc., 22 East 41st St., New York, NY 10017, tape \$24.95, cartridge \$39.95)

-Susan Remini

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As an airline transport rated pilot, I have spent a considerable number of hours at the controls of jet aircraft and I can tell you that this is a very realistic simulation of jet flight. It is by far the best flight simulator I have seen for CoCo. Pilots will recognize it as realistic and non-pilots will learn a lot about instrument flying in particular and flying in general from it.

The graphics in this one are super. The instrument panel looks and functions like the instrument panel in a real airplane. I particularly like the attitude indicator, which to the uninitiated, will seen to be operating backwards when indicating a bank. This is not so. It functions exactly like the real thing, you just have to remember that you and the airplane are rotating around the horizon, not vice-versa. The panel is marked in blue and red and the sky outside the cockpit is blue. There is also a heads up display (HUD) that shows you where you are in relation to the runway and, once you are established on the instrument approach course, it becomes an ILS indicator complete with localizer and glide slope. This is where there is one of the few faults in the program. The glide slope gives you true fly toward the needle indications but the localizer is backwards; that is, you must fly away from the needle in order to center it and thus be lined up with the runway center line during an instrument approach. I would very much like to see this corrected, for it would make this simulation a very effective tool for real flight instruction.

One of the options this simulation provides is the ability to select elevator and aileron sensitivity so that you can tailor the aircraft's flight characteristics to your own skill level. At the higher levels the aircraft really becomes sensitive to small control inputs. You can also select a mode in which a closed triangular course is provided for you to navigate. There is also a night flying option.

You can perform aerobatic maneuvers but there is a quirk here. Whenever you perform a roll or a loop you must perform the maneuver completely through 360 degrees. If you half-loop and then roll back to level flight the controls will be crossed. A split S will produce the same result. While in inverted flight, however, the controls are reversed just as they are in real inverted flight.

Gear and flaps function as in a real aircraft (be sure and power when you lower them because the aircraft will decelerate rapidly with them extended) and are controlled through keyboard inputs. One thing I noticed here is that the documentation says to press the "G" key to lower the gear but actually you must press the "D" key for gear down. After a landing information is provided in text form about the quality of the landing. If you should crash the screen goes crazy and then provides flight recorder data about the crash.

Two joysticks are required. I suggest the use of a spring center return joystick for the primary flight controls (aileron and elevator) as this gives some sensation of the liveliness of a real airplane's controls. A free-floating joystick should be used for the throttle so it can be positioned and left alone.

Finally there is one weakness that I, as a pilot, would like to see improved. In a real airplane, landings and descents (not dives) are usually made in a slightly nose up attitude, controlling aircraft speed with pitch attitude and rate of descent with power. This may seem strange to you nonpilots, but it's the way it's done (especially on landing). In this simulation if you place the aircraft in a constant nose level of nose up attitude it will maintain altitude or climb regardless of power setting or airspeed (unless you are below stall speed, then you drop like a brick). This makes touchdowns unrealistically difficult because you must touchdown in a slightly nose down attitude. It's less of a problem during an instrument approach but still slightly unrealistic as you must execute a shallow dive down the approach course and the only way to control speed is to hang out gear and flaps and use power. If this were corrected and the localizer indication corrected you would probably need a pilot's license to run this one.

Documentation is good and provides all the needed information to get you started on your flying career. The publishers also state that the program will be upgraded from time to time and that owners will be entitled to these upgrades at "little or no" cost. Let's see, if they added some visual (through the windshield) graphics and some combat features . . . Well, you could go on and on, but with the promise of future updates and the excellent program that already exists, this could only be called "the right stuff."

(KRT Software, P.O. Box 41395, St. Petersburg, FL 33743, \$19.95, cassette)

David Johnson



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Give Him Room And **Snoopy Really Flies**

Snoopy And The Red Baron, by Bob Schmerling, is a good example of the power of the CoCo's Extended Color BASIC. The program is advertised as a 16K game, but the package I reviewed included both 16K and 32K versions. There's a lot of difference between the two versions, and, as might be expected, the 32K version is far superior to the 16K version.

This two-player game comes nicely packaged in an attractive plastic book-shaped box containing the cassette tape and instructions for the 16K version. The two game players portray the "World War I Flying Ace" and the infamous Red Baron. Since there are so many differences between the two versions, let's look at them individually.

16K Version

The premise of this game is quite simple and straightforward. You select the approximate number of clouds you want scattered about the screen, grab a joystick and try to shoot your opponent out of the sky. The joystick can be used for both lateral and vertical movement. Any intervening clouds will block your shots, and if you run out of ammunition, you must land at your base and get resupplied. When you are in this situation you are extremely vulnerable to your opponent's fire. Firing is controlled by the buttons on the joysticks.

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29 monsters

You are trapped in the evil wizard's castle. To gain your freedom, you must pass through 29 rooms, each one guarded by a hideous monster who will only let you pass if you can devise the correct password based on the clues it gives you. If you are wrong, you will be set back along your escape route, and the same answers may not work a second time. This adventure game does not require you to guess words from its hidden collection.

On cassette tape. For 16K Color Computer. Extended BASIC not required.

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""Sorry, there's nothing sexy about this game"

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& b software

The clouds also impede your movements; for example, you can't fly through them, but must maneuver around them. The graphics are clean and colorful and while the animation is somewhat simplistic, it is well done within the limitations of 16K. The need to conserve ammunition and figure a path through the clouds to get your opponent within your sights provides an adequate challenge to the younger child, say up to 12 years old.

32K Version

This version of the game offers better graphics and a greater challenge to the players. I can recommend this version for ages eight to 108. The instructions for this game are contained within the program and are nicely presented at your option at the beginning of the game. This version is an outstanding example of what a good programmer can do with Extended BASIC.

The player has several options. You can use three predefined difficulty levels or you can define your own game parameters. For instance, number and location of clouds in the sky, range of fire, a jet stream in the upper limits of the screen (makes maneuvering more tricky).

Player control and movement in this version is either in a straight line, or clockwise and counterclockwise loops. Pulling the joystick toward you causes you to loop in one direction, pushing it forward causes a loop in the other direction. When the joystick is centered, you fly in a straight line, tangent to the point in the loop at which the joystick as centered. It's a little hard to get used to the controls, but once you do, it really is a nice way of maneuvering your plane.

You may fly through the clouds in this game. If you fly off either side of the screen, you come back into view on the opposite side. The ammunition supply is unlimited and the end of the game is predefined in the game parameters you select. When a plane is hit, it falls to the ground with some nice sound effects. The game gives a good simulation of a dog fight; Snoopy would really enjoy it!

The graphics are colorful, the animation is smooth, and the sound effects throughout are first-rate. I really enjoyed this version, and so did the kids.

If you've got 32K then I can recommend this package. If you've got 16K and children under 12, I still recommend it. Chances are, by the time your kids outgrow the game, you will have expanded to 32K and it will be like having an entirely new game. . . free!

(S&S Arcade Supplies, 8301 Sarnow Drive, Orlando FL 32807, 16K ECB cassette, \$18.95)

-Randall Smith

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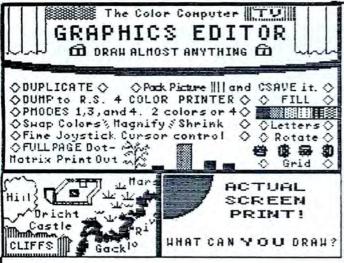
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40 POKE32753,4:POKE32754,64:PRINTQ480, "Select 32 to 85 letters per line, 1 to 27 lines on screen. :POKE32753,5:POKE32754,51
50 PRINT"Horks normally with host BASIC programs; Regular, Extended, on Disk."
60 POKE32753,6:POKE32754,42:PRINT"REAL lower case. Graphics as you watch." RUN Black or White Background

Select 32 to 85 letters per line, 1 to 27 lines on screen. Horks normally with most BASIC programs; Regular, Extended, or Disk. REAL lower case. Graphics as you watch. OK

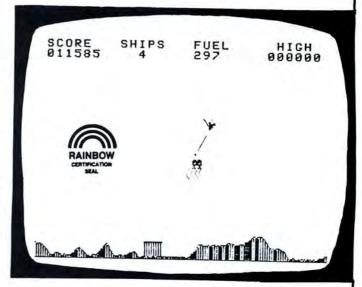
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Does this sound like an exciting scenario for a good arcade game? Well, it is! But, it is more than just an arcade game. It is also an adventure game.

I must admit, I do not like arcade games very much, because they never hold my interest for long. When I received *Fembot's Revenge* for review, I said to myself, "Another arcade game!" To my surprise, I was wrong. True.

it has some good shoot-em-up sequences, but the majority of the time, it's like an adventure game.

You must travel through the ship finding discs, opening doors, and destroying the Guardians. When you have killed all of the Guardians on one level, you will be transported to the next level only to find yourself having to destroy more Guardians.

One of the real challenges in this game is solving the riddle of the destruct button. If you find this button, you can instantly destroy all of the Guardians on the floor and advance to the next level.

The following are some of the features worth noting in this game: 3-D graphics (the graphics are excellent and realistic), a "hyperspace" flash belt, a special geiger to find the destruct button (believe me, it doesn't make it that much easier to find it), variable placement of objects after each level, and a detailed inventory of the player's status. This game is played in "real time," so if you just stand there thinking, you will increase your fatigue level. All of this, and periodic battles with Guardians make this a very exciting game.

(ColorQuest Games, A Division of Softlaw Corp., 9072 Lyndale Ave So., Minneapolis, MN 55420, 16K tape \$29.95, 32K disk)

-Paul Lee

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My dictionary defines 'deja vu' as the mistaken feeling that you've seen something before, when you really have not. But if you had the feeling last month that you had seen my Kibbits chat before, it wasn't deja vu! You really did see it — the month before that. As you can imagine, writing a new column each month can get somewhat hectic, especially as the deadline approaches... and passes. If this were just a plain article, the magazine could simply put in a note like "Mr. Stark's column will not appear in this issue, and will resume next month." But with an advertisement it's not that simple. I suppose we could have left this space empty...

STAR-DOS PRICE REDUCTION

Our STAR-DOS 64 has had such a good reception that we have decided to permanently drop the price. From now on, the regular STAR-DOS (for 16k and 32k systems) and STAR-DOS 64 (for 64k systems) are being bundled together into a single package which we will call STAR-DOS, and which will have the combined price of \$49.90.

Despite the release of OS-9 (a trademark of Microware Systems Corp.) and Flex (a trademark of Technical Systems Consultants) for the CoCo, we expect the popularity of STAR-DOS to keep rising for two very simple reasons. First, STAR-DOS is the only DOS which supports the standard Radio Shack CoCo disk format. Though we all hear about the large amount of software available for Flex and OS-9, the fact of the matter is that there are more programs available for the standard CoCo disk format than for OS-9 and Flex together.

Second, since OS-9 and Flex are also incompatible with regular CoCo Disk Basic, you must buy another Basic to get their full benefits. Not so for STAR-DOS, which can read and write the same files a Disk Basic can.

There is a good number of serious users of STAR-DOS among you; in fact, we have even licensed STAR-DOS to other software developers for inclusion in their own products. We're so enthusiastic about the future of STAR-DOS that we're willing to make you an offer you can't refuse: If you now have a DOS, any DOS for any machine, send it to us and we will trade you for a copy of STAR-DOS. Please — original documentation and disks only, and include \$3 for shipping.

To know STAR-DOS is to love it!

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If so, then you may be interested in a VFR Flight Planning program for the CoCo, available for \$24.95 for tape, or \$29.95 for disk, from Frank Lombardi, P.O. Box 373, South Salem, NY 10590.

That's it for now - see you next month.

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STAR-KITS SOFTWARE SYSTEMS CORP.

Monkeying Around With Junior's Revenge

If you have ever played the popular arcade game, Donkey Kong, Jr., then you won't have any trouble playing Computerware's *Junior's Revenge*. The 32K machine language CoCo version contains all four graphic screens, like the

original game.

If you aren't familiar with the game at all, here is a brief background. Junior is a little gorilla, trying to save his father from the clutches of Luigi. Luigi is a little red-haired construction worker, who in an earlier version of the arcade game, saved his girlfriend from an unsavory ape, Junior's father, and locked him in a cage. Junior's Revenge now adds new challenges to the original concept. You are no longer at a construction site trying to save your girlfriend from a gorilla. Instead, as a monkey, and proud son of Kong, you are deep in the jungle attempting to rescue your encaged papa.

There are four distinct boards of play: the Vine Screen; the Chain Screen; the Trampoline Screen; and Luigi's Hideout Screen, each appearing in a planned sequence. In the Vine Screen, your father is captive in his cage on top and you are ready to go at the bottom. You begin the game with four men and your objective is to swing from vine to vine, climb to the top, and get the key from Luigi and save your father. This would be a simple task except for the trained animals the revengeful Luigi has sent out to stop you—the

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"vinegators." They move up and down the vines seeking to kill, and any contact with them will destroy you.

You control the movement with the right joystick and jump by pressing the joystick button. You can either shimmy on one vine, or climb by using two vines, one in each hand. I found that climbing two vines is the quickest method to go up, while sliding down with one vine in both hands is the fastest way to descend.

Time is an important factor in this game because of the bonus timer in the upper right corner of the screen. If your bonus time runs out before you get the key from Luigi, you lose. Points are obtained by grabbing fruit from the vines along the way, or destroying the vinegators by patiently waiting until the vinegator is underneath the fruit and then nudging the fruit loose, causing it to fall and crush the vinegator.

Timing is the key to successful fruit dropping and vinegator killing. It takes a lot of practice to do this successfully every time. After completion of this screen, the amount of points left on the bonus timer is added to your score and you

will then be able to proceed to the Chain Screen.

In this screen, your main objective is the same: to free your father. The Chain Screen is made up of eight long chains of equal length. At the end of six of them there is a key. You must push the keys up the chains and force them into locks while avoiding vinegators and trying to again destroy them with the fruit. Another enemy to watch out for is the ZuZu birds, which move horizontally across the screen descending in zigzag fashion. Any contact with the ZuZu's will cause them to peck you until you fall to your death. They also proceed to the bottom of the screen and if you jump over them you will receive extra points. When I got to this screen of play I had a lot of difficulty. I could not complete the screen without falling to my demise.

In playing Junior's Revenge, it took a lot of practice in getting accustomed to the maneuverability of the joystick. I fell a number of times by not jumping just right or not having the joystick pointed in the proper direction. A nice feature of Junior's Revenge is its practice mode. By playing a practice game, you can figure out the manner in which the game is operating and learn the skills of the game without being destroyed by one of the creatures. You can only be destroyed by falling and your high scores are not kept in the top five. I found the practice mode to be a gratifying way to learn the game and its joystick movements. There's nothing I dislike more than finally getting the hang of a game and then being told: GAME OVER.

The sound effects in *Junior's Revenge* are pleasing and the graphics are fantastic and full of color. Consider the excellent graphic quality of *Junior's Revenge* as an example of the Color Computer's capability. *Junior's Revenge* lays to rest many of the claims I've heard of Atari's graphics superiority to the CoCo.

The Trampoline Screen and Luigi's Hideout Screen are a mystery to me because I have not yet been able to successfully reach them. I am sure that someday I will get to these screens and save my father from Luigi. I may have to read one of those booklets on how to beat computer games, but, the point is that *Junior's Revenge* is that challenging and that much fun to play. Several games that I have played were too easy, which caused me to lose interest after easily defeating them.

(Computerware, P.O. Box 668, Dept. F2, Encinitas, CA 92024, 32K tape \$28.95, 32K disk \$31.95)

-Jutta Kapfhammer

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DYNACALC will let your computer do just about anything you can imagine. Ask your friends who have VisiCalc, or a similar program, just how useful an electronic spread-sheet program can be for all types of household, business, engineering, and scientific applications.

DYNACALC is designed to be used by non-programmers, but even a Ph.D. in Computer Science can understand it. Built-in HELP messages are provided for quick reference to operating instructions.

DYNACALC has a beautifully simple method of reading and writing FLEX data files, so you can communicate both ways with other programs on your system, such as the Text Editor, Text Processor, Sort/Merge, RMS data base system, or other programs written in BASIC, C, PASCAL, FORTRAN, and so on.

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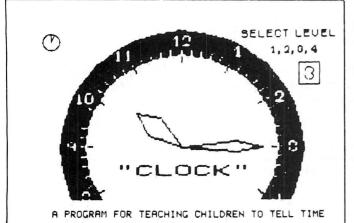




Here, A Pen Is Mightier Than Stick

You will find that this product review is somewhat unusual. For this review, I constructed a somewhat unique test program and a keyboard modification. Let me get the usual "what it does and how well" questions out of the way first. The Light Pen from Colorware is an alternate form of input that can be used with educational programs, games or experimentation. The Light Pen attaches to the joystick port and uses the digital-to-analog converter to change light intensity to a value that can be read by the "JOYSTK" command. The pen reads the intensity of light when touched to the video screen.

The pen comes with sample programs and adequate documentation to allow you to construct your own programs. To construct your own programs, you need some knowledge of BASIC but do not necessarily have to be an expert. When The Light Pen is used, a graphic block must be flashed when a location on the screen is being sensed. I would expect that this flashing graphic block may cause some problems for some individuals but found that this was not a particular problem for the severely handicapped students that I teach. The size of the flashing graphic block may vary according to the size and illumniation of the TV screen or monitor being used. In general, the block must be at least the size of a low-resolution graphic pixel.



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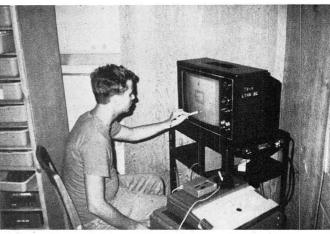
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When I used The Light Pen with an educational program with handicapped students, I did note two problems. Some students moved the pen very slowly across the screen and would sometimes select a wrong answer by mistake while moving towards the correct answer. In other instances some students would leave the pen on one answer selected longer than required and the selection would be given again by mistake. Perhaps these problems could be overcome by more creative programming, but these types of selection errors are a consideration. The light in a well-lighted classroom could cause an unwanted reading if the pen is directed towards the light.

On the positive side, there were several individuals that could correctly answer questions when using The Light Pen and could not answer correctly by other methods such as using the keyboard or a joystick. After ruling out these types of misreadings, I found that most, if not all students appeared to perform better with The Light Pen. There appears to be a more direct correlation between the action of selecting an answer and the position of the answer on the

In general, I feel that there are some excellent reasons for using a light pen with handicapped individuals or young children, as well as for those who simply like to experiment with an alternate form of input for the computer. The price of The Light Pen (\$19.95) is very reasonable. I would suggest that The Light Pen is a "must have" tool for those who use computers with handicapped young children. The Light Pen does have some weaknesses but for the price it is difficult to pass up.

Now, let's look at a unique test of The Light Pen. To thoroughly test it, I constructed a test program and some keyboard modifications (see Listing 1). The program preents a key word framed in the center of the video screen. This word is selected at random from the words, "TOP, BOT-TOM, LEFT, and RIGHT." Each of the words is then placed around the peripheral of the screen at the appropriate location. The task is to select the word that matches the word in the center frame. Students were given 20 trials each with five different methods of selecting the appropriate word. The methods tested three forms of input (ways the answer could be chosen) and two different screen formats (what appeared on the screen). These methods are described below:

1) Light Pen — The student would select the answer by touching a flashing graphic box below the answer with the light pen.

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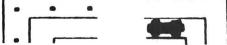
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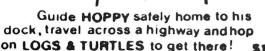
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2) Modified Keyboard — I constructed a modified keyboard by covering the keys with a piece of plexiglass with four selection keys. The student would select the answer by touching the key in the same relative position as the appropriate answer on the screen (see picture).

3) Joystick — The students would select an answer by moving the joystick in the direction of the appropriate answer. The position of the joystick is shown by a red flashing block

on the screen (under one of the answer words).

4) Modified Keyboard with screen flash — This is the same as Method 2 except that the flashing white graphic block was shown under each answer. This was done to determine if the flashing block (which must be used with The Light Pen) has a distracting effect.

5) Joystick with screen flash — The method of selection was the same as for number 3 but a flashing white graphic block was added to the screen.

The students using the program are "trainable or severely mentally handicapped students." Their average reading level is below second grade and some students neither read nor communicate verbally. Every student used all five of the

methods. The order in which methods were presented was selected at random.

On the average, students gave the most correct responses with the modified keyboard. The flashing of a graphic block had little effect. Students gave the least correct responses with the Joystick Method and again the flashing had little effect. Although The Light Pen was less effective than the modified keyboard for the average of the group, there were several individuals who could answer correctly with The Light Pen but were considerably less successful with any of the other methods. It appeared that most if not all individuals could best understand the method of selecting an answer when they were using a light pen. However, some students trailed over incorrect answers when selecting an answer and would leave The Light Pen on an answer long after the time required to make a selection. This would result in inadvertent selection of answers and lower scores than was obtained for the modified keyboard method.

Students had the greatest difficulty with the joystick. Students tended to move in the general direction of the correct answer but were not precise enough to make a cor-

250 02B8 540 058B The Listing: END ...081D 1 CLS 4 PRINT#-2,"":PRINT#-2,"--5 INPUT"WHAT IS THE NAME"; N\$:PR INT#-2, N\$ 6 PRINT #-2,"-----10 L(1)=78:L(2)=227:L(3)=251:L(4) = 43015 WS\$(1)="A TOP ANSWER": WS\$(2)= "GOOD JOB": WS\$(3)="RIGHT ANSWER" :WS\$(4)="THE BOTTOM LINE" 20 W\$(1)=" TOP ":W\$(2)=" ":W\$(3)=" RIGHT ":W\$(4)=" BO T TTOM " 50 CLS:PRINT"WORDS ? Y/N" 60 Qs=INKEYs:IF Qs<>"Y" AND Qs<> "N" THEN 60 100 X=RND(-TIMER) 110 FOR A=1 TO 5:X(A)=A:NEXT 120 FOR A=5 TO 2 STEP -1 130 U=RND(A) 140 T=X(A):X(A)=X(U):X(U)=T 150 NEXT A 200 FOR J=1 TO 5 205 X=X(J) 210 CLS 220 ON X GOSUB 240,250,270,260,2 80 225 PRINT: PRINT" PRESS ^ WHEN REA DY" 230 X\$=INKEY\$:IF X\$<>"^" THEN 23 0 ELSE 300 240 PRINT@232, "PEN": PRINT#-2, "PE N": RETURN 250 PRINT @232, "KEY FLASH": PRINT

#-2, "KEY FLASH": RETURN 260 PRINT @232, "KEY NOFLASH": PRI NT#-2, "KEY NOFLASH": RETURN 270 PRINT @232, "JOYSTICK FLASH": PRINT#-2, "JOYSTICK FLASH": RETURN 280 PRINT @232, "JOYSTICK NOFLASH ":PRINT#-2, "JOYSTICK NOFLASH":RE TURN 300 CLS 310 IF X<4 THEN W\$=CHR\$(207)+CHR \$(207):B\$=CHR\$(240)+CHR\$(240) EL SE W\$=CHR\$(143)+CHR\$(143):B\$=W\$ 320 IF Q\$="Y" THEN PRINT@L(1)-32 , "TOP":PRINT@L(2)+30, "LEFT":PRIN T@L(3)+31, "RIGHT": PRINT@L(4)+31, "BOTTOM" 330 PRINT@171,STRING\$(10,175); 340 FOR A=1 TO 3:PRINT@A*32+171, CHR\$(175);STRING\$(8,143);CHR\$(17 5);:NEXT A 350 PRINT@32*4+171,STRING\$(10,17 390 TIMER=0 400 FOR Q=1 TO 20 410 W=RND(4):PRINT@236,W\$(W); 500 FOR N=1 TO 4 505 K#=INKEY# 510 PRINT@L(N), W\$; 520 FOR D=1 TO 10:NEXT D 530 LP(N)=JOYSTK(O) 535 IF JOYSTK(3) <20 THEN JS=1 E LSE IF JOYSTK(3)>40 THEN JS=4 EL SE IF JOYSTK(2)<20 THEN JS=2 ELS E IF JOYSTK(2)>40 THEN JS=3 537 IF X=3 OR X=5 THEN PRINT@L(J S), STRING\$(2, 191); 540 IF K\$<>"" THEN K=INSTR("6DKB ",K\$):IF X=2 OR X=4 THEN 700

ect selection. They tended to ignore the information on the creen while they were making a selection. The program cept track of the total amount of time required to respond to 20 questions. Students responded fastest with the light pen and slowest with the joystick. The joystick selection method was significantly slower for this group of individuals and the ight pen was only slightly faster than the modified keyboard. It might be expected that these results are only typical for a handicapped population.

As a result of this study, I believe that I can recommend The Light Pen as a method for handicapped students to select answers for educational software. Certain students were more successful with this method than with other methods. However, the modified keyboard appeared to provide the most reliable method for students to respond.

(Colorware, 70-03 Jamaica Ave., Woodhaven, NY 11421, \$19.95)

-Dr. Charles H. Santee

545 PK=PEEK (65280): IF (PK=125 OR PK=253) THEN IF X=3 OR X=5 THEN 690 550 PRINT@L(N),B\$; 560 NEXT N 570 AV=(LP(1)+LP(2)+LP(3)+LP(4)) 580 FOR N=1 TO 4 590 IF LP(N)>AV+3 THEN AV=LP(N): Z=N600 NEXT N 610 IF Z=0 OR X<> 1 THEN 500 620 LP=JOYSTK(0) 630 PRINT@L(Z), W\$; 640 FOR D=1 TO 10: NEXT D 650 IF JOYSTK(0) < LP+5 THEN 500 680 GOTO 700 690 PK=PEEK(65280): IF PK=125 OR PK=253 THEN 690 700 IF X=1 THEN SL=Z ELSE IF (X= 2 OR X=4) THEN SL=K ELSE SL=JS 710 IF W=SL THEN RT=RT+1:PRINT @ O.WS\$(SL);:SCREEN O.1:PLAY"T4L80 2CDEFGABO3CDEFGABO4CDEFGAB":PRIN T @O." 730 IF W<>SL THEN WR=WR+1:PLAY"T 4L403C01C" 740 NEXT Q 741 TI=TIMER/60 745 PRINT#-2, "PERCENT = ";100*(R T/20); "%": PRINT#-2, " "; TI; "SE CONDS":PRINT#-2 746 RT=0 750 NEXT J 760 RUN K=INSTR("ADKB",K\$):IF K<>0 1000 **THEN 700** 1010 GOTO 545



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Rainbow's Corner Is Educationally Enriching And Fun For Children

By Carol Kueppers

Rainbow's Corner is the title of a group of learning programs, as well as the title of one of the games. Two of the activities are designed for two or more players; one may be used either alone or with others; and four are for one person. These programs are primarily intended for use by children from five to 11 years old. Although older children will enjoy them, they will not be as challenged. Several of these activities use the computer to help teach problem solving skills and are a welcome change from the now all-too-common drills.

In the game Rainbow's Corner, the object is to find the gold located somewhere in the castle of the Blue Snorgle. At the start of the game, the player has five gold pieces and the castle is represented by a large rectangular grid, divided into rooms, with the X and Y coordinates given along the sides. The player specifies the room he wishes to enter by typing in the proper coordinates, separated by a comma.

If he hears a sound the player is near the Gold-Gobbling-Grouch, and should seek elsewhere. If he enters the room of

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the Grouch, he hears a high pitched sound and one of his gold pieces is taken. The Grouch then enters another room, one that the player has not yet entered.

As rooms are entered, they are colored in. Further clues are given to the player as he progresses from room to room. The word *Vikes* on the screen indicates gold is near, while *Ho-hum* tells him that he is neither near the gold nor the Grouch.

The game is very effective in teaching the use of coordinates to specify location, and helps develop problem-solving skills. Any child who has learned to read a few words can play, with its appeal greatest among the younger group. Once children have become used to this system through the game, parents and teachers can show children the use of coordinates on maps and graphs in the everyday world.

I feel this game is excellent; however, because it is intended for use with children, I should like to suggest that the author correct some minor imperfections. Should a child inadvertently press [ENTER] before he has entered the coordinates separated by a comma, the screen scrolls. This places perhaps too great an emphasis on following the directions exactly. Also, in the on-screen instructions, the word "it's" is used to denote possession. Any parent could easily correct the latter before making a back-up copy.

Wraparound is a word game which can be successfully played by children from the time they have learned to read a few words. One child types in three words, each of which must have between four and 12 letters. His opponent is then shown the word "wrapped" on the screen in two rows of letters, with the initial letter somewhere in the group. The word is not scrambled, so that once the initial letter is found the player reads around and types out the rest of the word. He has three tries, and when successful, the letters are pulled from the block, and a colorful graphic display is shown. In addition to scoring points based on which try was successful, a bonus is given for speed.

This game can be used successfully in the home between parent and child with new vocabulary and spelling words. However, when two children play together trying to trip each other up, the game takes on a whole new dimension. Then, each seeks out unusual words and the contest encourages the learning of new words.

In Alien Codes, which is also for two or more players, one player types in a series of words—which can be random or part of a phrase—with a maximum total of 25 letters. These are then shown to his opponent in a box in the center of the screen, with no spaces between the letters, starting at a random location in one of the words.

As in *Wraparound*, the words are not scrambled and the phrase proceeds in order. The game is to move the arrow keys over the initial letter of each word and press the spacebar. If the letter is the correct starting letter of a word, a black box remains there and the player seeks the initial letter of the next word. Should he want help, pressing H will tell him the number of words chosen by his opponent. Speed is important here as he has only a limited time to find all the words.

The manual includes a story for the game, while the screen display shows the time remaining, score, and hints in the boxes, as an instrument display of the "spaceship." These graphics add to the fun of the game. Because this game deals in a group of words together, it is more difficult than Wraparound. The child can graduate to Alien Codes. Again, a parent can enter the child's reading and spelling words, or key phrases, but when children play together, if they are like



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my testers, they will try to fool the others with unusual combinations.

Gulp! is a terrific arcade-style game, which can only be played after successfully answering a simple addition problem. The answer to the addition problem is given in a number line beneath the problem, so the child just learning to add can count the squares in the number line.

After each correct answer, the answer is placed in a center box, and the player is given a chance to play *Gulp!* a Breakout style game, trying to get to the center square before the computer's "greedy gulp worm" gets to it. The player has a blue "mite" and is presented with a series of walls made of colored bricks. The mite moves up and down and breaks throuh a wall when the player presses the spacebar.

Each brick color has a different score value, so that, for a maximum score, the player must wait until his mite is opposite the brick he wants to break through before pressing the spacebar. If he presses the spacebar while next to an orange brick, the computer's worm advances. When the mite is at the last wall, the worm continues his advance, so the player should have his mite lined up before he breaks through this final wall and must quickly press the spacebar to win.

The game is challenging and a lot of fun for all ages, not only those who are learning the number line concept. To add to the educational value of this number line program, I wish the author had included a choice of arithmetic problems at different levels for different age groups. Among my testers, everyone loved the game, and it could easily have served as a reward for difficult problems for older children.

Pears, Berries and Figs is a game which can be played either against the computer or with two or more players.

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The game fosters deductive reasoning in a way that is fun. Although, as a one-player game, *Pears, Berries and Figs* can only be played against the computer, once groups of children have learned it, it can be played without the computer as a paper and pencil game on car trips.

This tape also includes two "math utilities." These are intended as a means for kids to check their homework. One program is for addition and subtraction, the other for multiplication and division. In the addition, subtraction and multiplication utilities, the problem is typed in followed by the answer the child obtained. If the answer is correct he is told that it is; if wrong, he is immediately shown the correct answer. In the division utility, if his answer is incorrect he is shown how the problem should have been solved by the usual long division method. Although some teachers and parents might like to have the children correct their homework with this type of program, simply so that the children gain more experience using the computer with the exception of the division program the child learns nothing more than he would from using a calculator. To have real merit, the program would need to include teaching hints after the wrong answer is given. This would include, in an additional problem, for example, asking the child to think and add the right hand column again with the computer stating if the correct answer was achieved, then asking if a number needs to be carried, and so on. The potential to use the computer to help the child reach the correct answer is not utilized by these programs, so they are the weakest in the group from an educational standpoint.

Parents are advised that they will want to make a back up tape, not only to preserve the original, but also because the programs are on the tape with only a miniscule gap between them. Thus, successfully locating the start of all but the first program without obtaining an I/O Error is more difficult than it should be. Children simply do not have the patience to wait for a whole tape to play in order to load the one program they want.

The tape is accompanied by a spiral-bound manual which includes stories for the *Rainbow's Corner, Gulp!* and *Alien Codes* games, explicit instructions for use of all the programs, as well as a section for teachers and parents. This is well thought out, complete, and shows the care taken with the programs.

In the front of the manual is a page indicating that school children helped develop these programs, and I believe it. Children do have fun with all of them. Because I believe that only those educational activities which children enjoy will actually be used, these rate highly. In addition, their suitability for a broad age range makes this a tape which will be used over a long period of time.

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Stellar Search Keeps On Treking

"To boldly go where no man has gone before." Thus began each episode of the weekly television series Star Trek. Owl-Ware's newest game for the CoCo, Stellar Search, is based on this series and allows you, the player, to actively participate in an Adventure simulating one of these episodes. Unlike many other "Trek" games on the market, Stellar Search tells a story, and it is this that my family and I found most satisfying.

The game itself is written in Extended BASIC with machine language data files and subroutines, and requires a 32K Color Computer. Stellar Search is comprised of five separate programs (including the introduction) and contains about 86K worth of programming. The four-page instruction booklet gives you all the necessary information to get started, but 80 percent of what you will need to know about playing is contained in the programs themselves. In fact, I had to play a couple of the games several times before I could avoid having the Enterprise shot out from under me in the first few minutes.

Before giving you an idea of what is involved in each program, there are several general points of interest that should be mentioned. Each program is loaded via *CLOADM* which uses the *AUTORUN* program marketed by Sugar Software. At the beginning of each program you are asked to set the "false color" mode in PMODE 4 by a simple Y or N response. Most other games I have played require you to reset the computer several times until the colors are satisfactory. Owl-Ware has done its homework on the "vitamin E" speed up *POKE*, and asks you if your computer can handle it or not, thus enabling the program to run on all system configurations.

Now into the programs themselves. The first program is an all text introduction and briefing of your mission and sets the mood for the following games. I will not describe the story itself, since much of the fun is seeing the plot unfold. Just keep in mind that each game is a continuation of the preceding one and all lead to a final conclusion in the fifth program.

The second program bears the greatest similarity to other Trek-type games in that you travel about on a grid from one quadrant ot another, fighting Klingons, avoiding black holes and refueling at various star bases, among other things. The graphics in this game are very well done and make the game that much more interesting. The most important thing to remember in this and the following programs is to use the [H] HELP key freely. This key gives you all possible commands for a given situation and since the commands differ from one situation to the next, it is a must to continually check your options.

The third program is the truest graphic Adventure program of the lot. The graphics in this one are the most impressive of all. The game itself is a puzzle requiring you to issue a specific set of commands in a specific sequence. Each command produces a graphic result, which either helps or hinders your mission.

The fourth program is an all text Adventure similar to many other Adventures, except that you provide one letter commands to direct your computer alter ego in his mission. Some of the commands, such as [U] for USE will cause the program to respond with "USE WHAT?" for which you then enter the item to be used. All in all, I would probably

consider this a novice level Adventure.

The final game is really three arcade type games in the same program. The first and most difficult involves landing the Enterprise's shuttle craft on a planet whose mountainous terrain must first be flattened using anti-matter bombs. Since the game was written mostly in BASIC, the keyboard controls are somewhat sluggish and, although there are four levels of difficulty, we couldn't succeed even at the easiest level. To continue on to the next phase of this game required a little cheating. For those of you who get as frustrated as I do, RUN the program and [BREAK] when the first phase begins. Then enter GOTO37 and you will be placed at the next phase. This second phase involves manuevering your shuttle into orbit about the planet while avoiding semintelligent space mines. Once past this, you will proceed to the final phase, docking with the Enterprise.

To summarize my review, I would say Stellar Search provides a varied gaming experience and would be a good program for beginning level adventurers of all ages. My son, age 14, enjoyed playing the games and has returned to play them again several times. For myself, age 30+, I enjoyed it the first time, much as I would a good book, however, as with many Adventure games, once solved, they tend to be put on the shelf. One thing I do know, is that whenever company shows up at the house, this series of programs is one of my first choices to demonstrate my CoCo's graphic capabilities.

(Owl-Ware, P.O. Box 116H, Mertztown, PA 19539, Tape \$27.95, Disk \$30.95)

-Ken Boyle

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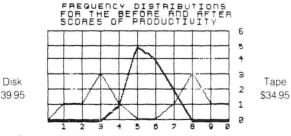
Cassette Controller Gives Total Control

he most time-consuming process of all cassette players is locating that special program on cassette. If you have ever experienced an I/O (input/output) Error, you know of the frustration involved in searching for the beginnings of programs when there are five or six programs on a cassette. There are only a few ways to solve this problem: to type in AUDIOON:MOTORON or unplug the jack to the cassette player which would then enable you to hear where your programs start and end; to only record two or three programs on a cassette which is very costly and wasteful; or to write the title the program was saved under and the counter position on the cover form provided with the cassette every time you save a program to tape. These methods mentioned can take up a lot of the computer operator's time that could be used more wisely.

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651 N. Houghton Rd. Tucson, AZ. 85748 ging cables. By the flip of a switch, the Cassette Controller makes the electrical connection in the remote line that allows the cassette player to turn on and enables you to hear your cassettes.

The Cassette Controller is a 3" x 2" x 1½" hard plastic box with a small built-in speaker and a six-foot spiral cord which simply plugs directly into the cassette port of the computer. The original cassette cord plugs directly into the Cassette Controller. There are two knob settings, either Auto, for normal computer/cassette operation, or Manual, which allows you to hear the cassette playing for total control of what you may use your cassette recorder/player for—without unplugging cables. When the Controller is set on the Manual position, it can be used to avoid unplugging cables on some standard cassette players and for listening for the beginners of computer programs. It can also be used to play or record music regardless of whether the computer is on or off.

The Cassette Controller is a nice accessory to own if you are using a cassette player other than one supplied by Radio Shack. Some standard cassette players require that you unplug the remote jack on the cassette player every time you want to go forward, fast forward and, in some cases, rewind. Although, some cassette players have been modified to rewind whether or not the remote jack is in, others still require you to unplug cables simply to rewind cassette tapes. The Cassette Controller will help combat these problems and prove to be an asset if you own one of the older standard models.

For those of you who don't allow the children to use your sophisticated stereo equipment for playing cassette tapes or recording, you can now let them use the computer cassette player with the turn of a switch on the Cassette Controller, and without unplugging cables, play and record safely and unsupervised.

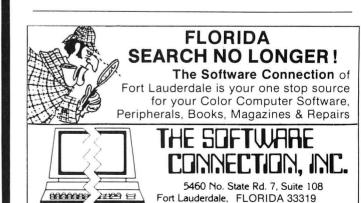
If you don't mind the hassle of entering extra commands or unplugging cables to listen for beginnings of programs, or in some cases to rewind, go forward, or fast forward on the cassette player then the Cassette Controller is probably not the most likely item on your list of things to purchase. However, it can be a useful item for helping organize your computer area and for avoiding the unnecessary cable switching when you wish to find the beginnings of programs.

I like the Cassette Controller because it is convenient and simple to use, serves several purposes and consistently works without fault.

(Vidtron, 4418 E. Chapman Avenue, Suite 284, Orange, CA 92669, \$25)

-Jutta Kapfhammer

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Peanut Butter Panic Makes You Stick Together

Children's Television Workshop, creators of Sesame Street and The Electric Company, has expanded its horizons now to include computer software. The Children's Computer Workshop has developed games for children in three age groups. *Peanut Butter Panic* is one of several programs in the Cooperation and Strategy Series, which is written for seven-to 10-year-olds. A CoCo with Extended BASIC, as well as joysticks, is required.

After *CLOADing* the program, you type *RUN*. This continues to load the rest of the program. The time it took to load seemed rather long so I timed it and also compared it to other programs. This program took about three minutes to load, which was two to three times longer than other programs. This is not really a problem as long as you and your child are aware of having to wait for awhile before you can start the game.

The game itself is quick-paced. It is a two-player game and encourages players to work together toward the common goal of making peanut butter sandwiches. Sandwiches are made by catching stars and putting them into the sandwich making machine. The stars are of varying sizes and the bigger the star, the more energy it feeds into the machine. When enough energy is built up, a sandwich is formed and stacked in the middle of the machine, between the two players.

The cooperation and strategy aspects of the game come into play when the players try to catch the biggest stars, which are high on the screen. A player jumping by himself will not be able to reach them. At either end of the sand-

wich making machine is a "star spring." If both players are standing on the spring, one player can launch the other player, which allows the second player to jump higher than if he was just jumping by himself. A decision has to be made as to who will do the launching and who will fly.

Each time a player jumps, he uses energy and grows thinner. He can be fattened up again by eating one of the sandwiches that the players have made A thinner player launched by a fatter one will fly higher than if the opposite course were taken.

Every once in a while a peanut butter-sandwich-loving "snarf" appears on the screen. It tries to snatch one o the sandwiches from the stack. It is up to the players to jump and catch is before it reaches the pile of sandwiches

At the end of the game, a scoreboard appears. The score tells how many sand wiches the partners made and how many the snarfs snatched.

The documentation is well-writter and extremely clear and helpful. It deals with all aspects of the software and car be followed by people with differing degrees of computer experience.

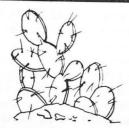
Educational software sometimes gets bogged down in book learning. It is refreshing to see a program that deals with teaching social skills. While playing the game, we laughed and panicked and had a lot of fun. Teamwork and cooperation were natural outcomes of Peanut Butter Panic.

(Radio Shack stores nationwide, Catalog Number 26-2523, tape, \$19.95)

-Stephanie Snyder

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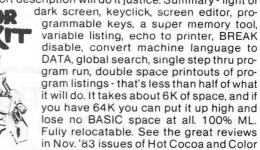
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Bomber Command Simulates History

In 1958, at the age of 12, I bought my first wargame. I still have it. Now, 25 years and many wargames later, I find that my interest in them has not waned. In fact, one of the reasons I bought my CoCo was the hope that I would eventually be able to play serious wargames on it. Thanks to Ark Royal Games I can do just that.

Bomber Command is a 16K wargame program for CoCo written by David Cochran and Phillip E. Keller. It is not an arcade game. It is a strategy wargame designed to simulate the elements of the airwar over Germany from 1941-1945. You control the Allied side and launch bombing missions from England against German industry and air defense elements, including anti-aircraft batteries and the Luftwaffe, on the continent.

Although the program is complex in design it is easy to learn how to play. The game is played in monthly turns. The player navigates his bomber force over a map of Europe controlling direction and altitude with the arrow keys. As



targets are located they are attacked and bombed. Tactics must be developed through experience to minimize losses while accomplishing the mission.

Each month reinforcements are received and the player has the choice of launching a mission or moving on to the next month and receiving more reinforcements. Skipping a month will enlarge your bomber and fighter forces but it costs you time while allowing the enemy to build more anti-aircraft and Luftwaffe units. A specific mission target is assigned each month and destruction of these types of targets on the upcoming mission will result in extra points.

While each turn is in progress the screen display shows a section of the map (which scrolls very nicely as you move) and an information section which details items such as altitude, heading, bombers left, fighters left, bombs left and fighter escort status. You can also call up a strategic map which shows the entire operational area and your current location. This map really helps in navigating to Berlin and Munich; the bombing of these two cities results in extra points.

The effect of enemy aircraft and anti-aircraft vary with the altitude of your bomber formation. This calls for a strategy of remaining at a high altitude until specific targets are selected, then diving to a low altitude (where bombing is more effective) to release your bombs. I particularly like the sound effects in this one; as the bombs impact they begin to explode one by one. You can even see the impact pattern as it spreads across the map while you are pulling off the target after bombs away.

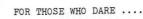
Victory conditions are not delineated, rather you simply try to maximize your point score over the course of the game which, from my experience so far, seems to last from two to four hours. Four difficulty levels are provided. Thus far I have stuck to the lowest difficulty and my highest score yet is 401.

Both maps are in the low resolution text screen but make use of limited graphics (the authors call it semi-graphics) and provide all necessary information as well as being geographically correct. Documentation is good. The instruction sheet tells you all you need to know to get started but it's left up to you to come up with the strategy that will bomb Germany into submission.

I'm a wargamer from way back so naturally I loved *Bomber Command*, it's great. If you buy it be prepared to use you mind more than your trigger finger.

(Ark Royal Games, P.O. Box 14806, Jacksonville, FL 32238, cassette, \$19.95)

-David Johnson





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As long as there are schools and tests, students will procrastinate. People will get nervous and hyper. But thanks to Flash Cards, a new program by Harmonycs of Salt Lake City, those cram sessions can now be at least a little better organized.

Utilizing repetition, *Flash Cards* reinforces those items of study that can best be learned by memorization. It is designed to help anyone from age six and up to memorize anything from math to medicine to mythology.

You have to imagine that you are writing your own flash cards when setting up your questions and answers. On the front side of the card, you are given two lines to ask a question or present a math problem. If you want to ask yourself a history question, such as who was President of the United States when this country entered World War II, you have two lines to enter the question (26 characters on the first line, 23 on the second line). You are then asked to put the correct answer (Franklin D. Roosevelt) on the "back" of the card. You can just as easily type 2 + 2 on the first two

lines of the "front" and the answer, 4, on the "back" side.

Up to 32 questions or problems (a minimum of five i required) may be presented. That should be plenty for mos people at one setting. Appropriate musical sounds accompany correct and wrong answers, and the student's score i displayed at the end of the program. Students also are given a second chance at the questions or problems they missed the first time through.

Flash Cards also offers the option of saving the variou study programs to tape so you're ready to review the histor lesson several times before the big test. It is written in BASIC and requires 16K Extended.

Although I have focused primarily on educational use here, it is easy to imagine *Flash Cards* being valuable t people in work situations. For example, someone in medirelations could prep his boss on the kinds of questions he can she would receive from the press about a problem and be prepared to answer them after a session with a program like this one. Someone in the military who had to face a review board while competing for higher rank could quiz himse on the kind of questions that would be asked. Attorney could use it to prepare their clients before a trial.

Flash Cards is basically a very simple program, easy t use, and reasonably priced. It also is a good example of th kind of learning tools that CoCo users are expecting an needing for their computer and themselves.

(Harmonycs, P.O. Box 1573, Salt Lake City, UT 84110, \$11.95 on tape)

-Charles Springe





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Airline — A High Flying Strategy Game

Would you like to see a program on the market that is different from the others? Are you business oriented? Do you have the desire to manage large amounts of money and make fate-wielding decisions? Well, if you do, and would like to try a thinking game for a change, then a new strategy game from Adventure International called *Airline* may be just what you are looking for.

With Airline, you have your chance (probably your only one) to make millions and to become a successful capitalist.

The theme behind this program is to decide on where to base the planes that you purchase with the allotted \$100,000 given to you at the beginning of the game and make as much money as you can through logical decisions. The choice of where to place your planes is a trying one since different airports will have different ranges of traffic flow depending on where they are located. For instance, New York will have a larger number of passengers going through the gates than Des Moines. Also, the types of planes which are based in your cities will determine your return since the different types of planes that you may buy can carry assorted amounts of passengers. The more passengers your aircraft can hold, the more greenbacks they will generate.

When the game begins, you and your opponent are each given money to invest in the purchase of airports and planes. Up to four people may play at once or, if you want some real competition, you may challenge the computer. There are 36 major cities located across the United States that carry a "price tag." By price tag, I mean that you must first purchase the "landing rights" before you are even allowed to land or base your aircraft in a city. The larger the purchase price, the more revenue it can generate.

Then, you must buy aircraft to transport your passengers from city to city to collect your fares, from which money you can buy more landing rights and more planes and so on. I think you're getting the hang of it now. Yes, the larger the plane the higher the purchase price, but the more fare revenues to be collected. Whew!

The game is displayed on your TV screen, and you are always informed of what to do or what is happening. On the left side of the screen are the letters representing your current options. They are: L — purchase landing rights, C — check the cost of the landing rights, P — purchase planes and Q — take no action this turn or quit. C and P present two other choices which must be made. C will clear the screen and display the cost of all available cities' airports (there is a card included with the documentation so that you don't actually have to keep switching screens) and P will ask you which plane you would like to own ranging from a prop job to the Concorde. If at any time you do not have enough money to make the purchase, the computer will let you know.

All choices or moves are made with the arrow keys and confirmed with the space bar. You can visually see where your planes are and where your opponent's reside, which airports are occupied by any player, and what planes are based there.

After landing rights are acquired and you own at least one plane, you can start to make your money. Also, planes must fly between adjacent airports that you own and not beyond, and no player may land in any other player's "airspace."

All calculating of fares and revenue is done by the computer and shown at all times so you don't have to keep track of your finances.

If you feel that a certain airport could be making more money (a large airport with a small plane) you can take a turn to buy a different vehicle and scrap the old one.

I think Airline is a welcome change from the usual fare of graphic games around. Although Airline starts off the same every time, the odds would be very high to play it the same way twice. The option of determining how many moves are allowed in the course of the game provides for different strategies. So, for those of you who are afraid of flying and would like the opportunity to toss around some big bucks, here's your chance. Remember, you won't come across any hijackers here—and best of all, you can forget about the airsickness bag!

(Adventure International, Box 3435, Longwood FL 32750, \$24.95 tape)

-Steven Schechter

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make data files to interact with their parents.

In Jail, the object is to determine the word selected by the computer. You are given the number of letters in the word by blank spaces. Begin the game by selecting a letter. If the selected letter appears in the word, the computer displays it in the proper sequence, and you are given the opportunity to guess the word. If your selected letter was incorrect the phrase OFF TO JAIL is spelled one letter at a time. Each selected letter appears on the screen allowing the player to keep track of his selections. The game is for one or two players.

Also on the tape you may play Scrambled Eggs, a game for one or two players in which you unscramble a series of letters. Again the Wordlist program allows for creating as many of your own data files as you wish. If the players have difficulty in unscrambling, helpful hints are provided.

Both programs are fun ways in which to increase your spelling proficiency.

(Mr. R's Software, 68 Kelly Road, South Windsor, CT 06074, \$16.95)

-Pamela Peitsch

Submitting Material To the Rainbow

Contributions to the RAINBOW are welcome from everyone. We like to run a variety of programs which will be

useful/helpful/fun for other CoCo owners.

Program submissions must be on tape or disk and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs. All programs should be supported by some editorial commentary, explaining how the program works. We're much more interested in how your submission works and runs than how you developed it. Programs should be learning experiences.

We do pay for submissions, based on a number of criteria. Those wishing remuneration should so state when making

submissions.

For the benefit of those who wish more detailed information on making submissions, please send a SASE to: Submissions Editor, the RAINBOW, P.O. Box 209, Prospect, KY 40059. We will send you some more comprehensive

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All programs require 32k Color Computer Disk System (Does not require joysticks!)

Software Review

Isle of Fortune Is A Real Treasure

Isle of Fortune is a text adventure that is a real advance on the quality of BASIC adventures. This adventure has the same goal that about 80 percent of all adventures have. The goal is very simple to find the treasure and bring it back to where you started, in this case a waterfront bar.

The instruction sheet that comes with the cassette is complete enough to answer most of your questions but, is really not that necessary. The only thing that you have to read in the instructions is how to load the program, more on that later. When you first run the program, after a few seconds, it asks you if you would like instructions. If you answer yes, it shows you almost the same things that the instruction sheet does. One of the best things the program tells you, that the instruction sheet doesn't, is a list of all the verbs it knows. This is a great help! How many of you adventurers out there, like myself, have spent hours, days, or even weeks trying to figure out what that special word or phrase was that you had to use to solve the adventure? It also shows its list of verbs whenever you use one it doesn't know. So, it's helpful to give it an unknown verb just to review the verb list.

One of the features that makes Isle of Fortune a step above almost every adventure game I have seen is that it goes to great detail to describe or give a description of everything. I'm sure everyone gets tired of looking at objects and getting the same response of "I see nothing interesting." The descriptions do change as things are done to them. When you break or shoot something, it tells you it has been shot or broken.

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A small annoyance that disk users have to endure, is that the program will not run with the disk cartridge in. To load and run this adventure, you must remove the disk cartridge (because it needs the extra 2K that the disk cartridge uses). This is one program that needs a full 32K computer to run. The repeated removal and insertion of the disk cartridge could cause some problems, so I suggest that you unplug the disk cartridge and leave it unplugged for awhile.

As a veteran of many text and graphic adventures, I am going to agree with the instruction sheet in saying this is a very difficult adventure and you must look at things very closely if you want to solve it. One aspect that makes this adventure harder than most is that when you start, it doesn't tell you which direction you can go, only what you can see around yourself. You have to find the compass to know which directions you can go. If you can't find the compass, you will just stumble around trying different directions randomly, as I did when I first played.

Isle of Fortune does have a couple of sports that can stump a beginning adventure for a while, because in a couple of locations, the regular directions N(orth), S(outh), E(ast), W(est), U(p), and D(own) wouldn't get you to the next location. In these locations you have to give it two precise words to get to the next location.

Overall, this has to be one of the best BASIC adventures ever written for the Color Computer. It does have a lot of interesting "rooms" spanning oceans, beaches, villages, jungles, and caves. The objects are so varied and interesting that they keep you constantly looking for new and different ways

(PAL Creations, 10456 Amanth Avenue, San Diego, CA 92126, tape \$19.95)

-Jeffrey Loeliger

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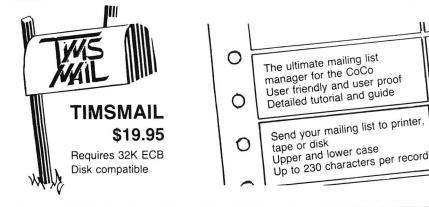
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Cooling Your Hot CoCo With The Dragonfly Fan

Because the Color Computer, like most microcomputers, has a nasty habit of getting hot, a number of cooling fans have been introduced to solve the problem. Some mount inside the CoCo, while others hang on the side of the unit. Almost all are rather large and many are noisy. A new fan that I received for review, the Dragonfly Fan, is very different from any that I had seen. It is small enough to mount inside the CoCo without any internal changes, draws almost no power, and makes very little noise.

The Dragonfly Fan is based on a quadrature fan module made by Piezo Electric Products of Metuchen, N.J. Instead of an electromagnetic motor as used in other fans, the quadrature fan is powered electrostatically. It has two plastic blades that are moved side to side by a pair of piezoceramic bending elements. The fan is approximately 3½" long, 2" wide and 1½" thick. It moves five cubic feet of air a minute yet draws only .11 watts (not 11 or 1.1, but .11!) from the 120 volt power line.

As supplied, the fan has a six-foot power cord and two

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pieces of foam tape. The instructions tell you to peel off the backing strips and attach the fan to the inside of the case top, near the cartridge flap, so that the mouth of the fan is pointed toward the vent slots. You then cut out a small notch next to the power switch so that the cord will come out next to the power button. I brought the cord out through the channel switch hole instead; this method doesn't require any cutting. You could also cut off all but a foot or so of the cord and solder the leads directly to the CoCo's power cord just before it plugs into the transformer.

One interesting sidelight on the subject is that a number of factors affect the heat generated by the chips inside and, thus, your need for a cooler. Integrated circuits vary greatly from part to part of the same type. One 6809E might work well at .89 MHz but crash at 1.78 (high speed on a CoCo). while the next part off the line works at 3.58 MHz even though it's only rated for 1 MHz. The reason that a chip gets hot even though it's not handling more than a few microamps of current is because of the fast switching that goes on inside the part. That notoriously warm SAM chip handles an incredibly large amount of switching in its job of routing signals among the CPU, VDG, ROM, RAM and port chips. POKEing 65495,0 to switch into high speed causes all that switching to occur twice as fast most of the time, and even more heat is generated. (That old hackers' tale about burning up a SAM by POKEing high speed, while an exaggeration, has a good deal of truth to it.) The higher the maximum speed of a given chip, the lower its operating temperature will be at a given speed; as an example, that slow 6809E that I mentioned will run hotter at normal speed than the fast part that came after it. If one chip in your machine (other than the SAM) is a great deal warmer than the others you may want to replace it with a faster part (for example, a 1MHz 6809E can be replaced by a 2MHz 68A09E). This rule also applies to RAMs, with the added note that 64K RAMs generally run cooler than 16K parts, since 64K are usually made to run at 150 ns as opposed to the 200-250 ns average of present 16Ks. This might be an excuse to upgrade to 64K.

After all is said and done, the real question is: Does the Dragonfly Fan actually help keep the CoCo cool? As it turns out, I was unable to tell if the CoCo was cooler with the Dragonfly Fan than without it. The particular CoCo that I used for testing runs cooler than most, and I never felt any excessive amount of heat on the chips either before or after installing the fan. I can tell you that the Dragonfly Fan moves a substantial volume of air through the CoCo, so it should help if the computer is overly warm. (The fan is suitable for installation in the standard models of the Color Computer, including the new 64K Color Computer, which have the vent slots on the left and right sides of the unit; I don't think it would work well with the TDP-100 or the new Color Computer 2, because of the top located slots.

The Dragonfly Fan is an attractive way to cool off the CoCo; it's certainly neater than an external fan, and it can be installed and then forgotten (but remember to plug it in). If your Color Computer does get hot, I wouldn't hesitate to try it.

(Dragonfly Software, 12503 Davan, Colesville, MD 20904, \$18)

-Ed Ellers

Software Review

Prepare For Tough Battle With Glaxxons

Glaxxons is a new machine language arcade-type game from Mark Data Products. I would call this game a cross between Galaxion and Centipede. Upon typing CLOADM, the game will automatically execute. After the title page has appeared, the computer asks for the game speed. A number between 1 (slowest) and 7 (fastest) will be sufficient. Next, the computer requests the level at which player 1 would like to start. Again a number between 1 (easiest) and 7 (hardest) should be entered. If another player would like to compete, he/she must enter their starting level, otherwise pressing [ENTER] will start the game.

The game begins with the words "Prepare For Battle" written across the screen. Your ship rises from the bottom of the screen with a high to low beeping noise. Then the words disappear and the action begins. About 20 alien ships start to appear from the top of the screen and take their place in the formation. Now is the time to shoot down as many aliens as possible because they will soon swoop down at your ship littering the universe with an array of missiles. You start with three ships and each ship can be hit three times before the shield power has been exhausted. If you are fortunate enough to defeat the squadron of aliens, a new batch in a new formation will appear destined to annihilate your fleet of ships. But if you're like me and you lose a ship before shooting down the squadron, a brand new squadron will swoop in to fend off the attack of your new ship. Once you lose all three ships, the words "Encounter Over" will appear

and the game is over.

I've played many CoCo games but this game definitely ranks as one of the toughest. Here are a few reasons why I make this claim.

- Your ship moves very slowly when compared to the aliens.
- Only one shot at a time may be fired by your ship while the enemies can fire a barrage of missiles.
- The enemy ships can move further to the left and right and can swoop back at you once they fly past your ship.
- The top row of spacecraft shoot guided missiles at your ship which are difficult to avoid.

These and many other factors make this game very difficult, maybe too difficult.

Besides the great challenge, this game has many extra features. The four different types of aliens are well animated and highly detailed. Hitting the [BREAK] key will pause the game. Pressing the [BREAK] key while entering the game speed will cause the game to be locked into the demonstration mode that can only be interrupted by hitting [RESET] or turning off the computer. All these features are sure signs of a truly professional program.

Glaxxons runs in 16K and is very bug-free. Although Galaxions is an old game, the Centipede movement of your ship adds a unique feature. I would recommend this game to people who like Galaxion or want to play a truly tough game.

(Mark Data Products, 24001 Alicia Pkwy., No. 207, Mission Viejo, CA 92691, tape \$24.95, disc \$29.95)

-Ken Coleman



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Mailing List Program Is No Fly-By-Night

When Mastermail first arrived in the mail I was disappointed. I really wasn't all that excited about reviewing a mailing list program. I didn't think you could do much for this type of program to make it interesting. Well, I was wrong. After spending 10 or 15 minutes browsing through the instruction manual my adrenalin started flowing because this is more than just another mailing list program. It is a program that not only has potential for the home computerist but for serious business applications as well.

Mastermail is a disk-based mailing list program designed for small businesses or anyone that needs a program capable of handling 1000 addresses on a single disk. To use Mastermail you need a 32K disk system. If you have a second drive then each data disk can hold 1200 addresses. This program has a lot of bells and whistles that make it quite useful for the user that has need of manipulating large numbers of mailing addresses.

An 11-page instruction manual in a three-ring binder comes with *Mastermail*. The instructions are written quite well. There were only a couple of sections I had to read more than once to understand. The author uses the left-hand side of each $8\frac{1}{2}$ " x 11" sheet for written instructions. On the right-hand portion of the sheet he illustrates what the various screen displays look like that the instructions are describing. There are several misspellings and at least one error in the instructions. They are, however, quite obvious and do not affect the usability of the program.

Mastermail has many features that make it quite useful for the user, particularly if you are running a small business. Each address can hold up to six lines of information. Three of the lines are for items such as name, street address, company name, phone number, or anything else you want to include. There is also a line for the city and state, and a line for up to a 10-digit ZIP code. The sixth line is a powerful code line that will handle eight digits of information.

Mastermail is quite easy to use. After making your working copy from the master disk you simply respond to the on-screen prompts to set the disk up for a single or multidrive system. You are then asked to provide a name for your data file. After formatting the disk for your file a menu is displayed giving several options: ADD ADDRESSES, DELETE ADDRESSES, EDIT ADDRESSES, FORM LETTER, PRINT ROUTINES, and SORT ROUTINES. The Add, Delete and Edit Address options are similar to many other database type programs. I'll not go into detail about them but they are straightforward and very easy to use. One piece of information that you can enter for each address is a code. This is very powerful and has unlimited application. I'll discuss it in more detail later. By the way, Mastermail holds very little data in memory. If you hit the [BREAK] key, or the program crashes for some reason, you will only lose one address.

FORM LETTER is a separate program that comes with *Mastermail* which allows you to produce multiple letters addressed to the people you have selected from the address database. The way it works is you must first create the body of the letter with a word processing program and then save the file to disk in ASCII format. You then load the file in

using FORM LETTER and take advantage of some excellent features the author has added. For instance, the program will default to the first line of each address for the opening of each letter, but if you want, you can create a different opening.

Another option is to change the closing of the letter. The default is "Sincerely, . . . " plus the first and second line of your return address, but again you have the flexibility of using a different closing. There are several other options the FORM LETTER program has that allows you to tailor the letter to your specifications. I used the FORM LETTER routine with a letter I had saved using *Telewriter-64* and it worked just fine. One problem I did notice, though, was that the heading (name and address to whom the letter was written) didn't line up on the left margin where I normally put them. It is something that would be easy to adjust, though, since the program is written in BASIC.

The PRINT ROUTINES are used to print labels that are printed across (up to 11), the number of vertical spaces between labels, which lines of the labels you want printed, etc. Once you have entered a format you like you can save it for future use.

Now for what I feel is one of the best features of this program; the code attached to each address. The first input for every address is the code. Here you enter up to four letter codes plus four number codes. Here is one example of how the coding system could work. Let's say you own an appliance store and one of your customers purchased a VHS video recorder. His code may look like this: RV 8309. The R stands for video recorder. The V for VHS. The 8309 stands for September 1983 (the date purchased).

In December you decide to have a special sale on VHS recording tapes. You could send a notice to all your customers, but you would be wasting money since a lot of them wouldn't have a video recorder, or more specifically a VHS video recorder. This is an opportunity to use the CODE PRINT option. In this routine you can enter up to 17 letter codes. If any of the letters match an address code then the address is given to the number code check. The number code helps you even more to mail advertising to the right people. Let's say that you only want to notify those people that have made their purchase in the last year. One way to use the number code in this example would be to specify a cutoff date of, say, 8301 (January '83) and the present date of, say, 8312 (December '83). Using these specifications, Mastermail would print all addresses of people that purchased a VHS video recorder from you between January and December of 1983. You could then use the FORM LETTER routine to send a flyer or even a personalized letter to each customer of this select group.

There are numerous other features available with this program but I'll not cover them in this review. The most recent copy of the program I received does all the things it is advertised to do but there are numerous spelling errors on the screen displays and some other minor problems with the program. The author is working on these problems so by the time you read this review, corrections should be made. I feel this is an excellent piece of software and would recommend it to anyone needing a system with the kind of features I've described.

(Spectrum Projects, 93-15 86th Drive, Woodhaven NY 11421, \$49.95 plus \$3 SH.)

-Michael K. Hunt



DYFIN Is A Useful Financial Planning Package

DYFIN is a financial planning program that aids you in making loan decisions, and helps you study investments to determine returns on annuities and savings plans. A perpetual calendar is included in the package, as well as an adding machine function to aid in checkbook balancing. The self-documenting program operates from a menu and needs no reference manual or separate instructions. While the program has several useful features, it won't replace the need for a loan amortization program or a checkbook register.

Dynamic Electronics supplies the program on a cassette tape which can be easily backed up to tape or disk. The on-line instructions provide all the details needed to operate the nine different sections of the program.

The program begins by paging through the instructions for each section before displaying the menu. This can be very frustrating once you are familiar with the program's various selections. After returning from a particular function, you are presented with the menu choices, at which time you can select to review the instructions for the whole package again. A more effective arrangement would be to select the instruc-

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tions for each function from the menu. This would be similar to the *help* function usually supplied with self-documenting systems.

The *DYFIN* package includes seven financial planning functions:

ANNUITY—calculates the future value of a savings account with regular deposits.

INTEREST—tabulates the annual figures for a onetime investment at a fixed rate of interest.

RETURN—gives the above future value of a one-time investment at a single future date.

OBTAIN—calculates the deposit required to reach a particular savings goal.

SAVE—computes the savings you would realize by early payment of an installment loan.

WITHDRAW—figures the maximum amount that can be withdrawn from an initial investment over a specified period.

LOANS—gives you the payment required for a particular loan agreement.

Two other functions are supplied:

ADDEM—provides an adding machine for numbers, dollars and cents, or checkbook balancing.

CALENDAR—calculates the day of the week for any date since 1753 (the first full year of the Gregorian calendar). It also displays a calendar for any specific month.

Some options deserve further comment. The LOANS option does not provide all the information you might want in an amortization calculation. A more useful program wuld provide a table of payments, showing the contributions due to interest and the amount applied to reduce the principle. DYFIN also fails to specify the amount of the last payment, which often differs by a few cents from the normal payment.

The ADDEM option is of limited value. It does not calculate a subtotal for the *numbers* or *money* selections. It also fails to format the intermediate balances while using the *checkbook* option. This check balancing feature does not allow you to keep a register of checks, or keep separate bank and book balances. It really only serves as a simple adding machine.

The calendar option is useful, but would be more helpful if it provided a printed calendar of selected months.

I am sure the *DYFIN* package will not suit everyone's needs for a financial planning package. Its functions have limited application to home finances and simple interest calculations. However, if the features described above are what you are looking for, then give *DYFIN* a try.

(Dynamic Electronics, Inc., P.O. Box 896, Hartselle, AL 35640, 16K Extended or Disk BASIC, \$19.95 on cassette)

-Stuart Hawkinson

Hint . . .

Have you ever wanted to devise a simple "odds/even" or "heads/tails" utility program? If so, this might help:

10 RND(2)-1 (YIELDS 0 OR 1) 20 RND(2)>1 (YIELDS 0 OR -1)

30 ((RND(2)>1)*2+1 (YIELDS 1 OR -1)

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STATEMENT WRITER - For use with (and requires) Disk Double Entry. Produces statements suitable for billing from your Receivable accounts. Provides mailing labels to use with your statements and account summaries. Designed and documented to allow you to change formats to accommodate your own special needs. \$34.95.

DISK DATA HANDLER - 64K - Designed to use the full 64K RAM, but may also be configured for 32K. Uses standard ROM's - No special operating system required! Allows you to design disk data files for your specific needs. You define a basic record of up to 14 fields and 246 characters. Provides fast selection and sorting based on any field or combination of fields in this record. Powerful on screen input and update. User defined output of reports to screen, printer, or disk files which may be read by your BASIC programs for any computational or special formatting requirements. Printer reports allow headings, page breaks, and page numbering, and let you pass control codes to drive your printer's special features. Maximum number of records you may work with at one time will depend on RAM configuration and record size - 64K (32K) 1850 (500) - 21 char records, 179 (49) - 246 char records. An optional Extended record linked to the basic record may also be defined. The size of this Extended record is not a factor in determining maximum number of records. Will provide the growth capability needed for your increasingly sophisticated applications. NOW - also includes a listing of a short program to read directory information from your disks and produce a combined file index. \$54.95 in BASIC with Machine Language subroutines.

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ALL PROGRAMS require Extended Color Basic and are delivered on cassette. All, except Tape Date-O-Base Calendar, are DISK System compatible.





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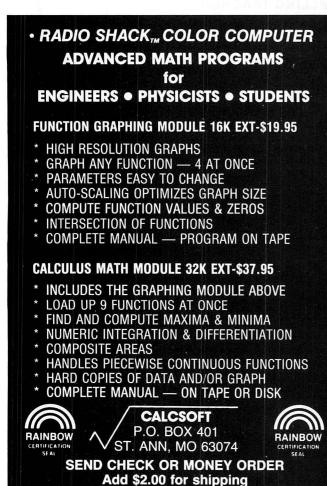


Doctor's Tableside Manner Unfriendly

Many times we need to look at disk data files to see what is stored there. A quick printer listing may be needed. Sometimes it's useful to edit those files without calling up the special program that created them. Once in a while a file may be unreadable, due to a missing end-of-file mark. Most sophisticated disk operating systems provide utilities to list and edit files, but not so with the Color Computer DOS. The *Data Doctor* is designed to overcome these limitations and provide an essential disk file editing capability. However, it's not a friendly text editor like most word processors.

Superior Graphic Software has produced a file editor with a number of useful features. It will build files, edit, or delete existing lines, and list or print the files. The *Data Doctor* will also allow you to retrieve files which are not normally readable due to missing end-of-file errors. The program has a number of editing features including insert, delete, retype, and change words in a line. Edited files can be saved back to the disk.

The *Data Doctor* is written in BASIC and operates in a line-by-line mode. More powerful editors like *Scripsit* operate in a full screen mode, in which you can select items by moving the cursor. A line-oriented editor like the *Data Doctor* only allows you to select a line number for editing.



Any changes to the line are then made by first typing the words to be changed, followed by the new text.

The delete option allows you to delete a range of lines. You can also insert a number of lines after a specified line, or retype a complete line. All files to be edited or listed must be in ASCII. BASIC programs can be edited if they have been saved with the ASCII (,A) option.

Other commands include a selective listing of lines to the screen or printer and loading and saving files. The listing options do not include any formatting capability. Printed output will be the same as file format, except for an indentation of four spaces for each new line.

The program returns to the main menu after each operation, so you have to keep in mind the line numbers of your text. If you forget the next line to be edited, you must return to the listing mode and try a new range of lines. Some other line-oriented editors keep a display of previously selected lines on the screen. This makes it easier to reference the next line number for editing.

All the information needed to run the program is covered on a scant four pages. The instructions for recovering from a disk read error are easy to follow. The program will allow you to recover data up to the point of an error, although there is no mechanism for reading past the error. The instructions also describe how to alter the program to merge two or more ASCII data files.

During several hours of operating the program, I detected a few errors and design flaws. You can work around most of the problems, but some are really annoying. For example, after executing the *SAVE* command, the program returns to the *LIST* option. The program should return to the menu. (Line 72 needs a RETURN added.)

I encountered a problem with the delete command. It doesn't like line numbers greater than the last line in the file. If a range of line numbers ends with a number greater than that found in the file, the program deletes the number of lines specified in the range! For example, perhaps your file ends with Line 55. If you try to delete 41 to 60, the program deletes the last 20 lines, 36 to 55. (I would expect Lines 41 to 55 to be deleted.) Most line-oriented editors would delete from the first line in the range to the end of the file.

The LIST command doesn't like out of range line numbers, either. Specifying an out of range line will result in a fast scroll through the text with an immediate return to the menu. The message about how to stop scrolling usually scrolls right off the screen. A much better strategy would include a slow scroll option, and/or relative line references. It would be easier to say "list the next 5 lines," rather than to give the absolute line number ranges each time.

You can get confusing results after a few deletes or inserts near the beginning of the text. Sometimes a file will have Line 0, other times Line 0 will be blank. Once you have a Line 0, you are stuck with it. However, you never know if it's there without listing from zero.

The *Data Doctor* does allow you to edit text files and recover from some particular problems. However, I prefer a more friendly editor. Many of the full-feature word processing programs will give you more capability for nearly the same price.

(Superior Graphic Software Products, P.O. Box 451, Canton, NC 28716, 32K disk, \$49.95)

-Stuart Hawkinson

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Money Manager won't rescue you from the results of deficit spending, but it can be useful in keeping track of just how far in debt you're going to be. Its approach is similar to using the envelopes.

This menu-run program allows maintenance of up to 26 budget categories (including savings accounts), named any way you like up to eight characters each. If you want, *Money Manager* will alphabetize the accounts. You may add or subtract amounts from each category, noting where the money came from or where it is going, the date and the check

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number (if applicable). Make a mistake? You can replace or delete transactions.

If you have a regular paycheck with the same amount each pay period, you can take advantage of *Money Manager's* budgeting feature. First, determine the annual amount you expect to spend for each category and divide by the annual number of paychecks. The program then will automatically credit each account with the amount decided upon each time you inform CoCo that you have received a paycheck. (NOTE: Lying to your computer won't help your bank account unless you have access to *their* computer.)

The budgeting feature will be of little, if any, use if you have an irregular paycheck; ie, it will not proportionately divide irregular income or unexpected bonus checks. Those must be divided and credited individually to each category. If you have more money than needed to pay your bills (some programmers are optimists), you will need to create a "Miscellaneous" category into which to put it. If you have less (join the crowd), the deficit will be shown.

If you use your checkbook to record *all* your income and expenditures, you can use *Money Manager* to verify your checkbook balance. However, this should not be confused with a full checkbook balancing subroutine.

After an initial PCLEAR 1, a 32K system can handle only 300 transactions with this program, which means starting over when you reach the limit. Money Manager's approach to this problem is to allow periodic condensing of the accounts. For instance, if you have 25 accounts with 299 transactions and condense them, you then will have only 25 cumulative transactions with their current balances. Data may be saved (tape or disk) and a hard copy printed before condensing (and after) so that you have a record of all transactions to that point.

Its author calls it user-proof, but then he doesn't know me! Take my word for it — selecting the *PRINT* option without having the printer on will cause the program to hang up, requiring you to push the [RESET] button (and consequently losing data upon return to the program). This could be avoided either with a simple *PEEK* routine in the program or else by paying attention to what you're doing.

Documentation is good but could be improved with sample entries carried through each routine.

In deciding what budget program to purchase, it helps to know how its features fit your style of budgeting. Some people want to keep it simple; some want or need all kinds of extra help. My ideal includes setting up a budget based on a biweekly paycheck; having a monthly summary; letting the computer do the set-up calculations and proportionately divide income of any amount among the categories without having to input each one separately; carrying a "cash" category that doesn't require me to use a check for everything; having a real checkbook balancing routine; and the ability to call from memory any month's expenses, perhaps with a yearly summary — all for a SASE.

Money Manager is fairly straightforward, can help you keep track of every penny and carries a moderate price tag. So check the features, compare prices — and debit your account.

(Reitz Electronics, 3170 W. Central Avenue, Westgate Meadows Shopping Center, Toledo, OH 43606, 32K ECB cassette, \$24.95)

-Warren S. Napier

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Balloon Attack—A Game . . . **But A Better Learning Tool**

Balloon Attack is an arcade-type game that follows a theme similar to the invader-type games. In this one, a hot air balloon is flying overhead dropping objects on you. The goal of the game is to try and avoid as many falling objects as possible. Most importantly, the game can also be used as a teaching tool for people wanting to learn how to write games such as this using machine code.

The game comes with a 25-page manual that lists the machine code, and has comments for practically every line describing the programming techniques. For instance, all of the routines that draw a figure on the screen have been purposely written in varying ways. This was done to show some of the different methods in which a typical routine can be written. Thus, a major purpose of Balloon Attack is to provide a little help and guidance for budding software authors. The author states on Page 1 that the program will run on any TRS Color Computer.

As for the game itself, I was somewhat disappointed with Balloon Attack. It starts off with a hot air balloon rising to the top of the screen and then traveling back and forth

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Dept BBD3 P.O. Box 243 Sumner, WA 98390 dropping objects on your man on the bottom of the screen. You have no offensive weapons in this game. The strategy is to just avoid as many falling objects as you can until time runs out. You are awarded points for each object that you avoid and penalized for each object that hits you. When time runs out your final score is displayed and you can start again if you wish.

You do have the option of using a joystick or the right and left arrow keys. I found the arrow keys to be much more responsive than the joystick. In fact, I just plain didn't like the joystick response at all. I must admit, though, I do have the original joysticks that Radio Shack designed for CoCo. so this may be part of the problem. At any rate, I lost interest before time ran out the first time I played it.

For the price the game sells for, I certainly expected more action and challenge than it provides. The fact is, the balloon is randomly dropping objects so fast that even if you let your man sit still on the screen, you still score more points than you lose most of the time. In fact, I tried getting hit as often as possible several times when I played the game and only once did I manage to finish the game with zero points. If I tried to avoid the falling objects, I was normally able to score over 28,000 points rather easily. I would rate the graphics about average and the sound a little below average.

I have not dabbled in machine code, so I'm not sure how good the explanations are, but they look to be fairly comprehensive. You can see, step by step, exactly how the game was written and executed. I would say it looks as though the manual is written for someone with some experience in machine code, because there is no tutorial provided, just the source code with comments. But, with the disk version and the Micro Works assembler, you could even reassemble portions of Balloon Attack.

I was also disappointed in the instructions provided to get the game started. The first page tells you how to start the game, but you have to figure out how to get it loaded into your computer by yourself (and there are two BASIC files, one binary file, one data file and two text files!). By looking at the disk directory I was able to figure out how to do this, but there should be some instructions provided.

As you can tell, I am not overly impressed with the play of Balloon Attack, but I can see possibilities for someone wanting to learn how a game such as this is written. Primarily, it is more of a learning tool than a game.

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-Michael K. Hunt

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The programs are constructed in much the same way, demonstrating the use of artificial intelligence in computers, the way they "learn" and simulate the human thought process.

When you first load them into CoCo, they are like naive children. As you play, the computer learns from your responses, becoming more intelligent with each new round.

If you need graphics to appreciate the programs you feed CoCo, forget it. These programs are for those who can appreciate CoCo's appetite to digest and assimilate logical connections.

Don't get the idea that these programs are not fun because of the abilities they demonstrate. Body Parts gets to be downright bawdy if you supply the "right" answers, and Guess the Animal is really silly at times.

In Body Parts, you are asked to think of a part of your body, which can be X-rated if you're so inclined. Just remember that the computer will learn exactly what you tell it.

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two- or three-word phrases. Simple clues that describe some attribute of the part are best, such as "It smells" or "They are wet."

You will answer one or more questions from the computer, telling the truth, of course. If you intentionally mislead CoCo, you will confuse the learning process.

When CoCo thinks it knows the part, it will take a guess. Early in the game, the guess will usually be wrong. At this stage, CoCo is expanding its knowledge base. You should type in the correct answer, answering a couple of more questions afterwards.

The program does not store the relationships in a tree form, according to author Bruce M. Cook. Rather it dynamically searches for the best clue available to narrow down the number of possible body parts. After a round, when the true body part is known, the knowledge base is adjusted to reflect the original clue that was given, as well the responses to all of the questions that were asked. This approach allows the program to quickly home-in on a guess and provides variety to the game to keep it fresh and interesting.

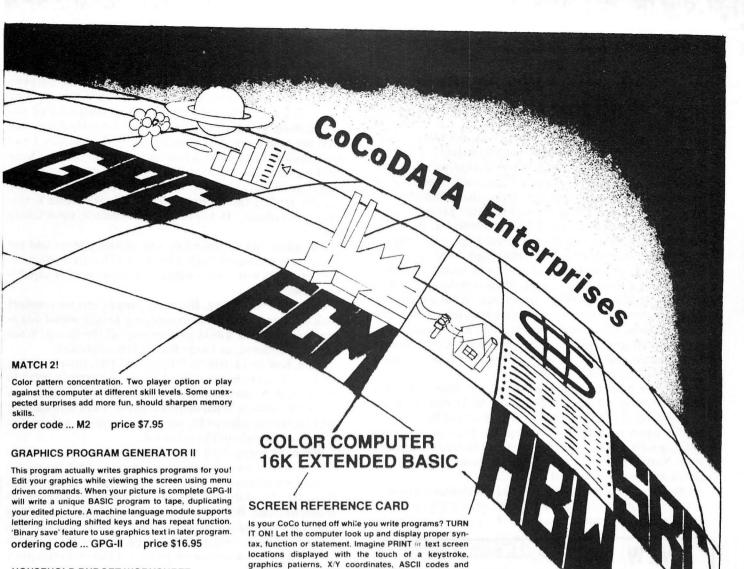
Guess the Animal works much the same. You are asked to pick an animal, give clues and answer questions about the subject. I submitted elephant, for example, and CoCo asked: "Does it eat flies?" and "Does it jump?" Obviously the animal already included in the program is a frog, so the questions are indeed ridiculous in the early stages.

The more information you give the computer the more intelligent it becomes (an understatement if I've ever written one). The only problem is that the programs' memories are erased after you get through playing and you've got to start all over again the next time, right? Wrong! Elite Software provides details on how you can save the existing stage of the program to tape, putting you way ahead the next time you're in the mood.

The programs also come with both 16K and 32K versions on each tape, the difference, of course, being the amount of data you can store. They also are written in machine language so the games do move along at a good pace.

(Elite Software, Box 11224, Pittsburgh, PA 15238, sold separately: \$17.95 tape, \$20.95 disk; sold together: \$24.95 tape, \$27.95 disk.)

Charles Springer



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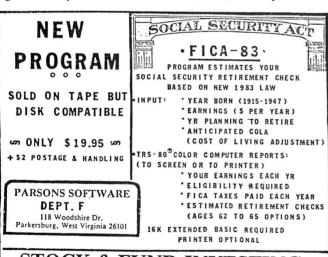
Tom Mix Flies Again With *Buzzard Bait*

Just minutes from my office there's a super video arcade that I pass by or through daily on my way to lunch. I visit the establishment often just to see if there's anything new, often wondering how soon this game or that one will be adapted for use with CoCo, sometimes believing that it would not be possible for some of the more sophisticated games.

Take Joust, for example. I have marveled at the game from afar, never able to get close enough to play it during the lunch hour because there are always people lined up in front of the machine. The game appears to be such a challenge that I know I would waste more than two dozen quarters trying to build up a level of competence. What a sight it is, those knight-mounted Ostriches flapping their wings and soaring about, squawking and chirping, and running with the speed of greyhounds when they land. Could such a sophisticated game be suitably adapted to CoCo? I must admit I had my doubts.

I did not have to wait long to get the answer I really wanted. Yes, said Tom Mix Software, we've done it again! And, indeed, they have done it again. Buzzard Bait convinces this writer that there is nothing that the many geniuses working with CoCo programs can't reproduce and improve upon. Save your money at the arcades, folks, because these games are a lot more fun at home!

I have sampled Buzzard Bait's endless challenges dozens of times since it auto-loaded on my monitor. If you're into games and you're still stuck at 16K, this probably will be the



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118 WOODSHIRE DRIVE PARKERSBURG, WV 26101 program that makes up your mind for you that you absolutely have to upgrade, at least to 32K, and while you're at it, you may as well go all the way to 64K.

The first time through, my eight-year-old son Stephen absolutely flew circles around me. There I was running frantically about, hopping up and down while his bird was flying about with the grace of an eagle. I quickly discovered that my young one had been spending the quarters I had been saving. I had no idea how to make my bird fly. "Keep pushing the firebutton, dad," he said. It took me a little while to get the message but I discovered that if I repeatedly and rapidly pushed the firebutton on my joystick that I, too, could soar about. "Hey, I'm flying," I cheered, upon taking

The game can be played by one or two players and the object is to proceed to higher levels of difficulty by destroying the enemy warriors — who also are mounted on capable

Okay, so I was flying. But every time I came into contact with an enemy warrior it seemed, my knight would disappear and my bird would go flapping off the screen. What gives, I wondered, as I kept fleeing those maniacs.

"Son, how do I kill them?" I pleaded. The answer was that my knight has to be positioned above an enemy in order to eliminate it. Sounds simple, but these folks seem to have a mind of their own. What confused matters was that when we got close to the edge of the screen, the action would switch wrap-around style to the other side.

When the enemy bird has been dismounted, the bird flies off the screen (which was distracting at first because it seemed so curious — those birds flapping their wings). However, the rider of the bird is transformed into an unhatched egg. Within seconds, the egg begins to expand and crack during a marvelous rebirth cycle. If a riderless bird comes into contact with the egg, the enemy gains new life. To stop this regeneration process, a player must capture (touch) the egg.

As the game progresses, certain land masses begin to crumble away. This not only gives you and your enemies more room to fly but it also allows for strategic maneuvering. In addition, it adds a distinct element of danger because, if you are careless, you are engulfed in pool of lava at the bottom of the screen.

There are as many levels of difficulty as you can master, each of them fraught with peril. Although you are in a competitive situation in the two-player mode, you can gain extra points for cooperating in trying to defeat your common enemy.

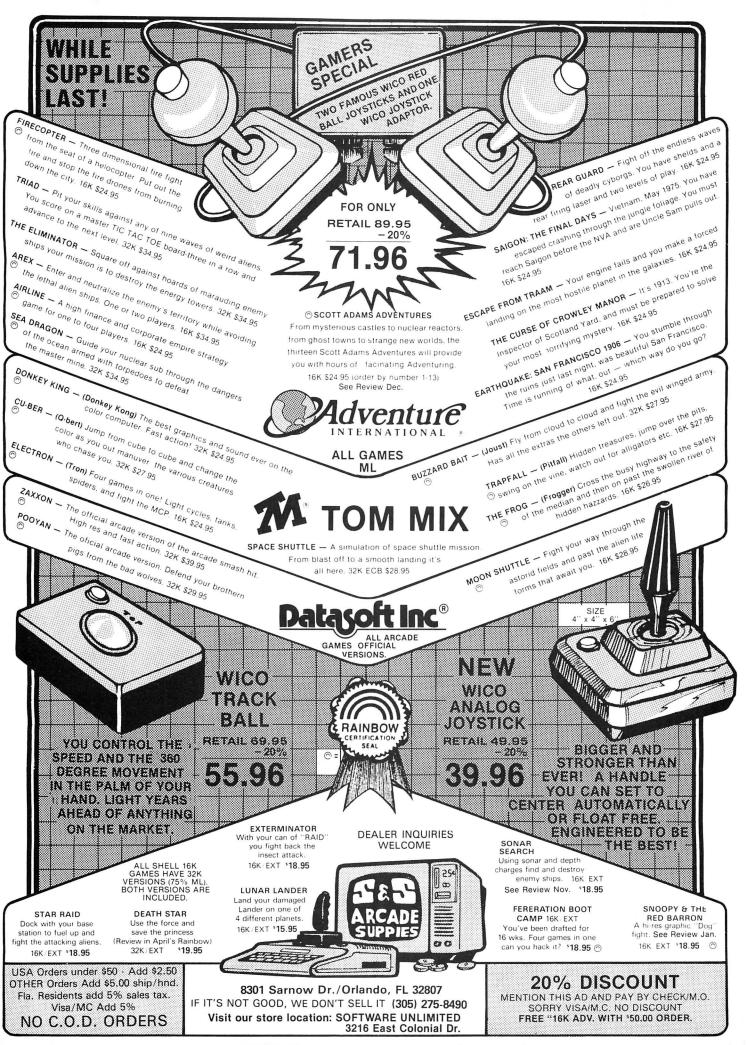
And than there's the deadly Pterodactyl (or the Buzzard, the game's namesake). He can strike at any time and you're almost powerless to defend against this menace. Your only hope is that you've mastered your Radio Shack joysticks to the point that you can lance its throat. The Pterodactyl occasionally brings friends along and since his appearance is unpredictable, you have to be alert, always.

If you panic at any time, you can always hit the "P" key on your keyboard and halt the action. If you're beyond hope, you can simply tap the "R" key to immediately begin a new

Excuse me, but I'm going to tap the "R" key now, and get back to this fascinating game.

(Tom Mix Software, 3424 College N.E., Grand Rapids, MI 49505, \$27.95 tape, \$30.95 disk)

—Charles Springer



Early Games Rates an 'A'

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A unique feature of this program is the menu and how the programs load from the menu. An example of each of the activities is flashed on the screen for a set amount of time. The sequence is continued until the [ENTER] key is pressed. The game that is being shown on the screen is loaded into the computer. Adult supervision is needed for this part of the program, but a child will soon be able to operate the program with a little assistance. When the child desires to play a new game the [BREAK] key is pressed and the menu is run again. The same procedures are followed for starting a new program. Here is a brief description of the nine activities in Early Games.

Match Numbers — A large number is displayed on the screen. The object is to match the number with the proper key.

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Subtract — Same presentation as the addition game but a minus sign is used.

Match Letters — Same format as Match Numbers but a letter is shown on the screen.

Alphabet — The game is structured for learning the sequential order of the alphabet. A letter is displayed on the screen and the child is challenged to find the next letter. If the response is incorrect, the alphabet is displayed up to the letter being questioned. Another incorrect response and the letter is displayed in the correct position. When the response is correct, the letter is displayed and the computer proceeds to the next question.

Names — Adult supervision is needed for this segment of *Early Games*. The child may then practice typing her/his name with guidance from the computer.

Compare Shapes — Four different shapes are displayed on the screen each with a number. All shapes are the same color but one has a different shape. The shape must be identified and the correct number must be entered.

Draw — This element of *Early Games* allows very young children to have the power of drawing right at their fingertips. The position of the keys on the keyboard determines which direction the cursor will move. Upper keys draw up; lower keys draw down; corner keys draw diagonally. The space bar changes the color of the cursor and of the lines that are drawn after the change. Pictures may be saved to disk and retrieved at a later time. The drawing is done in a low resolution mode, which is fine for the targeted age group.

This program was extensively tested by a three-year-old and a five-year-old. THe five-year-old had little trouble after five minutes of instruction. The construction of the program still provided a valuable learning experience for the three-year-old.

Rainbow Report Card

Appropriateness — Right on the button. The activities presented have been developed with the child in mind.

Documentation — Provides the necessary information for program operation in a 10-page booklet form.

Ease of Use — Program operates without any problems and is structured for use with small children. [BREAK] key is configured for returning to the menu. The only way to crash the program is to shut off computer.

Meeting of Objectives — *Early Games* provides meaningful learning experiences for the young child. Meets program objectives on all counts.

Enhancements — Some variety in the reward for answering correctly would be a nice addition. Hearing the same tones for a half hour does get to your ears.

Grades

Appropriateness	A
Documentation	C
Ease of Use	A
Meeting Objectives	A
Final Grade	Α-

(Counter Point Software, Inc., Suite 140, Shelard Plaza North, Minneapolis, MN 55426, 16K Extended Disk BASIC, \$29.95)

-Rick Cobello

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Color Micro Journal

The Color Computer Monthly Magazine

\$1.95 per issue Vol. 1, Issue 2 October, 1983

THIS 'N THAT

The BIG NEWS this month is that OS-9 has finally arrived for the Color Computer. The ASTOUNDING part of the Radio Shack OS-9 Package, besides the price, is the DOCUMENTATION. You 'Old Time Radio Shack Followers' will not believe what you see. Jon Shirley has been telling us that the main reason for the "lack" of documentation with a lot of their products was the restrictions placed on

OS-9 on the COLOR COMPUTER

One of the "Operating Systems of the Future" is now available for the "little old Color Computer"; OS-9. Freely translated, OS-9 means "Operating System" We had been running a preliminary release

Color Computer OS-9; the Package

for the 6809" (OS-9 is now being written of OS-9 on the Color Computer for a few for the **68000**, also). Since it is fairly weeks, and received the "Official Radio obvious that UNIX and "UNIX-Type" Shack" version for Review a couple of Operating Systems will be running on just days ago. To put it mildly, this package about every computer to come out in the is IMPRESSIVE! For \$69.95 (Radio Shack next few years, a whole new language is Catalog Number 26-3030), you receive a 9 eleasing that information by Microsoft; I beginning to appear on the horizon. 1/2" x 7 5/8" x 2" package containing 4

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Schematic Drafting Processor

Cosine, secant, tangent three-point-one-four-one-fivenine. Slide rule, T square . . .

I'll bet you've never heard that cheer before, or probably never want to again! Well, it's obsolete anyway. The slide rule, once hanging from the belts of engineering students, were replaced by pocket calculators and, more recently, by CoCos. Gone are the T squares, too. All replaced by CAD (Computer Aided Design) systems and the Schematic Drafting Processor.

In CoCo language you spell CAD "SDP." SDP the Schematic Drafting Processor, is a 480 x 540 pixel drafting board program written by Tony DiStefano and distributed by Spectrum Projects.

The object of the program is to draw, save and print electronic schematics. In recent issues of the Rainbow, you may have noticed that some of the schematic diagrams that accompany hardware articles have been computer generated. These drawings were produced using SDP. SDP requires a 64K CoCo and one disk drive. A Radio Shack, Gemini or Epson (with GRAFTRAX) printer is required for hard copy.

The 480 x 540 pixel drafting board is actually composed of six different screens, each available with a simple command from the keyboard. The well written manual claims

the first *PCLEAR 24* graphics in existence. Not only can you draw over 30 common electronic symbols at the touch of a key, but you can define 10 of your own. A cursor is used to locate all symbols, and with the proper commands, also draws the connecting lines between them.

The first prompt of the program asks whether you want arrow or joystick control. In the joystick mode, the speed of the cursor is controllable. Not only can you draw diagrams, but you could have contests to see who can do them the fastest. Really, this is very handy, as long lines seem to take forever with the arrow keys.

There are several modes of operation, all well prompted, and pressing the [CLEAR] key in any mode will display a mini-help file. A quick summary of the modes is in order.

From a Main Command Mode, you can enter the Draw Mode, Angle Mode, Logic Gate Mode, Multipin Chip Mode, Erase Mode and Text Mode, to name a few. The modes are self-explanatory with the exception of the angle mode. Each symbol can be drawn in one of four different positions, each being 90 degrees apart. I hope you noticed the Text Mode. Your drawing can even have component numbers and values where they're supposed to be.

Since the width of the computer screen is not exactly double the width of the draft, there is an overlap between adjacent screens. This is very nice for joining lines between two screens. A sample schematic is included with the package for you to experiment with the different commands. It also helps point out the versatility of the program.

The 14-page tutorial is excellent. It explains each mode of operation and gives tables and examples of all symbols.

Marymae industries, inc.=

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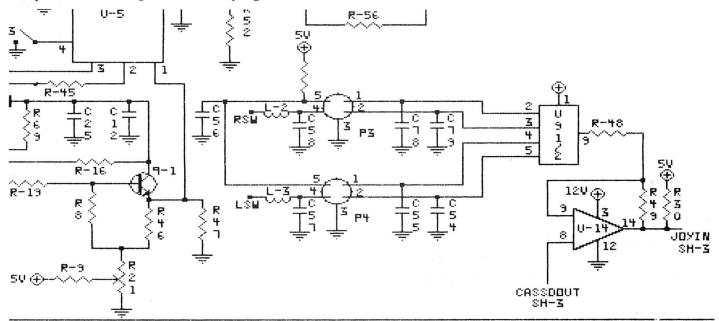
JOE McMANUS



TELEX: 77-4132 (FLEXS HOU)



Sample schematic using Schematic Drafting Processor



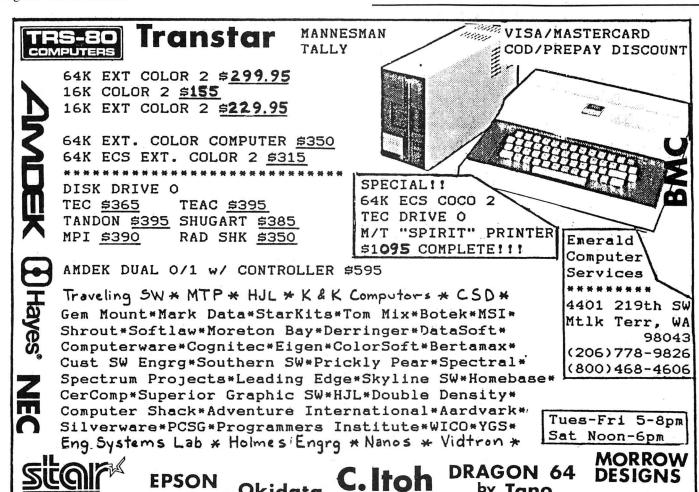
There is also a short example showing how to generate your supplimental symbol table that can be saved and loaded from disk.

If you are hardware inclined, I think SDP will be well worth your investment. I don't think you will be able to take it to your drafting class, but it will pay for itself by eliminating the cost of erasers.

A word processor for drawings. Now, if it only could do automatic projection studies.

(Spectrum Projects, 93-15 86th Drive, Woodhaven, NY 11421, 64K disk, \$49.95)

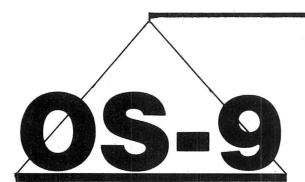
-Dan Downard



Okidata

by Tano

WHICH "WEIGH" TO GO?



Taken from Microware's brochure, "OS-9 is a Unix-like multitasking, real-time operating system. Its modular structure makes OS-9 easily adaptable. OS-9 is widely used for applications in data processing, industrial automation, communication, instrumentation and

OS-9 FEATURES:

- Real-time multitasking executive.
- Hierarchial disk-file directories.
- Device independent, interrupt-driven I/O
- Modular software memory management
- * Command interpreter with I/O redirection

Developed by Microware and Motorola about 3 years ago, OS9 has enjoyed a loyal following among users. There are several very good languages available for it. These include Basic 09, Pascal, "C" and Cobol. Also, there are 2 exceptional Word Processors; DynaStar and Stylograph. To check spelling, Dynaspell and Stylograph's spelling checker are available. OS-9 is an excellent choice for control applications, and because of the demand for UNIX like operating systems it is an excellent choice for the CoCo. On the CoCo it offers type-ahead and a limited multi-user capability. Disk support is single-sided, double-density up to 40 tracks. Printer baud rates up to 4800 are supported. The operating system also provides graphics capability although the text screen, like that under RS DOS, is only 32 by 16. Memory is 42K of user RAM (33K with the use of a HiRes screen).

FHL has more software for OS-9 than everyone else combined! The perfect first choice is 'O-Pak', which adds a Hi-Resolution Screen and Copy utilities. Many other software packages require O-Pak to function. Some of the other OS9 software packages available from FHL are: SUPER SLEUTH Disassembler, CRASMB Cross Assembler, DYNAMITE+ Disassembler, A/BASIC Basic Compiler, and DO - A Job Control Language. Check our other ad for specifics or better yet, get our catalog. It's FREE!

FHL FLEX is the most popular "true" operating system for the CoCo. It has been available for 2 years and has more software available for it than any other Color Computer operating system. FLEX is easy to use and is known as being 'User Friendly.' The abundance of excellent software available makes it a good choice for the CoCo. FLEX has 46K of user RAM WITH a HiRes screen. This makes it possible to run complex business software like A/R, and spreadsheets like DynaCalc. FLEX supports 35, 40, or 80 track single or double-sided 5 1/4" drives. It even supports 3" drives! With FLEX you get:

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- Online HELP capability
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- Great programming ease
- A User Friendly environment
- A system suited to the casual user
- The most support software for any CC DOS Hundreds of articles to help the new user

All this for only \$69.95 Optional DBASIC \$30.00 extra.

FINAL NOTE

Making the choice between two very good operating systems is undoubtably difficult. No other small computer has such a rich choice. The Color Computer user is extremely lucky to be able to choose from such offerings. So, the choice is hard. You could buy both and then decide, but that is costly. Many of the CoCo publications have been writing articles and columns about FLEX for 2 years, and similarly many will be writing about OS-9 too. It may take a while before a comparison can be made from them. The best way to decide for now is to determine what your software needs are and buy the operating system that supports them. We at FHL support BOTH operating systems. Call us for help concerning software availability or any other assistance you may require. Send for our FREE 32 page catalog and see our other ads.

*OS-9 is a registered trademark of Microware Inc. and also FLEX is a registered trademark of Technical Systems Consultants, Inc.

FHL Color FLEX

FLEX is the disk operating system you need to run all this software and more on your 64K Color Computer! A singleuser system designed to be very powerful yet very easy to learn to use. FLEX features dynamic filespace allocation, random and sequential file accessing, batch job type program entry, user startup facility, automatic drive searching, file dating, space compression, complete user environment control, English error messages, smooth scrolling and much more!

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CSP is a utility for executing user defined procedures. These procedures, or Command Stream programs, resemble BASIC programs in appearance but actually consist of a combination of direct commands, input data for programs being executed and Command Processor control commands.

A user creates a Command Stream program in the BASIC program area using all the standard CoCo tools (LIST, EDIT, SAVE etc.) then "attaches" it to CSP by making a call to one of the sequence of commands and data that would normally be entered at the CoCo keyboard were the program running interactively. A simple Command Stream program looks like this:

10 LOAD "SUM"

20 RUN

30:2,3

40 RUN

50:10,15

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This procedure loads and makes multiple runs of a BASIC program called SUM which prompts for two numbers and displays their sums. Note that the line numbers are used for building the Command Stream program and that the colons in Lines 30 and 50 are used to separate the numeric data from the line numbers.

Once CSP is invoked, it takes over the keyboard line input RAM hook so that any "read" by the BASIC interpreter or a running program gets data from the Command Stream Program instead of the keyboard. When all the lines in the Command Stream program have been read, the RAM hook is restored so that subsequent reads go to the keyboard.

Two versions of CSP's position independent machine code are delivered on tape; a "short" version, which occupies only 140 bytes and a 450 byte "long" version which provides some additional functionality. The version to be used depends on the amount of available RAM and the user's particular application.

Two major features found in the long version, but not available in the short version, are error handling and Command Processor control commands. The error handler feature optionally causes CSP to abort processing of the command stream program if an error occurs, instead of continuing ahead as the short version does. Command Processor commands give the user additional flexibility in writing Command Stream programs by providing the following features:

Print Control—Optionally display lines of the Command Stream program as they are being executed (the short version unconditionally displays them).

Keyboard Input—Allows reading of one or more lines of input from the keyboard from within the Command Stream program.

Subroutines—Allows the user to define and call subroutines in the Command Stream program.

By using these features, some fairly complex and powerful procedures can be implemented easily.

Overall, I found CSP to be well documented and easy to use. By copying CSP and an attached Command Stream program to disk or tape, commonly used procedures, like making tape backups, can be prepackaged and executed as needed, without having to remember and enter each individual step. For the serious CoCo user, CSP is a powerful and useful utility to have.

(Custom Software Engineering, Inc., 807 Minutemen Causeway, Cocoa Beach, FL 32931, \$19.95)

-Gary E. Epple

64K for S

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Comp-U-Trace Is Nice, **But Not Worth Price**

A simple yet useful tool in the programming of graphics has been packaged by All Event Video Productions. The concept behind Compu-U-Trace is simple. You take a sheet of clear vinyl and lay it over a picture or drawing and trace the picture with a grease pencil. The tracing is then attached to the TV screen. Now, as you program your graphics, you can follow the tracing overlay on the TV. This system bypasses the tedious work of using video screen graph paper. The idea is that the user can program better graphics more easily when the artwork is directly over the TV screen. Of course, if the artwork is much larger or smaller than your TV screen, you are out of luck.

Be warned! This is not a drawing program or a programming aid. You must still program your graphics the same old

way using the usual Extended BASIC commands.

The kit is made up of three clear vinyl overlays, a mechanical grease pencil with colored leads, an instruction booklet, and a cassette tape containing a screen location program and some graphic examples. The screen location program included in the kit displays a scale (by 10s) along the top and side of the graphic screen to help in finding X-Y coordinates. For applications where you must know the exact X-Y coordinates of your graphics, as in some types of games, it would be easier to use the traditional graph paper type layout. For title pages and graphics that lend themselves to "free-hand" techniques, the tracing overlay will certainly make better graphics easier to create.

The manual briefly describes the contents of the kit and how to use it. Considering the simplicity of the system, the documentation is more than adequate. The graphic examples included on the cassette are interesting but do little to

help you make your own graphics.

You must still provide all creativity and programming skills, but complex pictures are much easier when you are following a tracing. Comp-U-Trace can help you to improve your graphics and bring impressive graphic "scenes" within the reach of the average non-artistic hobbiest.

The big problem I have with this kit is it's rather high priced (\$29.95). This is an idea that anyone could manage on their own with just a piece of clear plastic. True, packaging and documentation count for something, but this system is so simple and the supplies are so low-cost that the price being asked for Comp-U-Trace seems simply outrageous.

(All Event Video Productions, 333 Cirby Way, Suite 55, Roseville, CA 95678,16K Extended \$29.95)

-James Ventling

The KEY-264K is here!!

DO YOU HAVE A 32K SYSTEM WITH 64K MEMORY CHIPS ??

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*** Works with DISK based systems! ***

The <u>KEY-264K</u> divides the 64K ram memory into two 32K banks or sides, each of which can be utilized independently the BASIC interpreter, with the ability to switch instantly from one side to the other. IT'S LIKE HAVING TWO COMPUTERS IN ONE!! Have your BASIC program on one side and keep your variables on the other side, or have your main program on one side and your subroutines on the other side, or have your program on one side and use the other side for 4 additional HI-RES pages, or any combination you like. The possibilities are endless because the KEY-264K allows full communication between sides plus the ability to switch back and forth at will, all from within BASIC. You could also have different programs in each side and switch back and forth between them using simple keystrokes, even while the programs are running!! Or run them both at the same FOREGROUND/BACKGROUND MULTI-TASKING mode. Don't buy that printer buffer yet! With the KEY-264K time in the FOREGROUND/BACKGROUND MULTI-TASKING mode. Don't buy that printer buffer yet! With the <u>KEY-264K</u> you can be printing in the background side while utilizing your computer normally in the foreground side AT THE SAME TIME!!! Debugging a program? Use either a BASIC command or simple keystrokes to instantly duplicate your program, in it's can be present status, on the opposite side. Switch to the opposite side later and pick up exactly where you were before!

For DISK users, the <u>KEY-264K</u> allows you to alternate between DISK and EXTENDED BASIC on the same side with simple keystrokes. No need to pull your controller or power down. You can be in EXTENDED BASIC on one side and in DISK BASIC on the other side and still switch back and forth and have full communications between the two sides.

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Prereader Provides Fun For Adults And Kids

When my little nephews come over to visit and play with my toys, one thing always haunts them. They want to play with the computer, too! Now I don't have a lot of software that would entertain a small child for more than five seconds. So I started to look for some really interesting young children's games. Well, the games available for those little urchins are rather sparse. What I saw didn't hold my attention for more than 10 seconds. I guessed that there might be something in the educational game area.

There are some very good titles being put out for early learning. One of them is *Prereader* from Sugar Software. In Level I, the little person plays a game of match-up. They will use colors, shapes, numbers and upper- and lowercase letters. Here they will learn to recognize the different letters of the alphabet, as well as colors. After the child has mastered Level I and has learned to associate sounds with the letters which represent them, he or she will be ready for Level II.

Level II matches single letters and consonant blends with their corresponding sounds. For example, in Level II, there will be a picture of a frog. Below it will may be the following letters: Fr Cr Fl. You then move your marker under the correct pair and press the fire button. If you are correct you will get a happy face and a happy tune. If you are wrong, you get a second try. On the third incorrect guess, up comes Mr. Unhappy face and you get an unhappy tune. The correct answer will then be pointed out. At the end of the round you are given the number of possible points and the percentage you had correct.

The graphics used in Level I are fairly good. Some of them are very creative. But lots of them are no help at all. It took me several tries to guess some of the shapes. Look out for the orange! After several times through the game, I think I figured out all of them but one. All I know is that the correct answer is S1.

There are a lot of features to make this program friendlier to younger children. First, the [BREAK] and [ENTER] keys have been disabled. Next, almost all input can come from the joystick, even the menu items. From the first menus to your final score, color and sound abound in these two programs. Prereader also uses Sugar Software's auto-run loader. Using the auto-run loader really simplifies things for the smaller computer users. Complete instructions are provided for transferring the two programs over to disk. Once on disk, Prereader will automatically use the disk when switching between programs.

I really enjoyed *PreReader*. Everything was easy to use and fun to play. I hope more publishers follow Sugar Software's ideas. The graphics are really clever and amusing, though sometimes hard to understand. *Prereader* should provide a very enjoyable evening for both parents and children.

(Sugar Software, 2153 Leah Lane, Reynoldsburg, OH 43068, 32K Extended tape, \$19.95, disk \$24.95)

-Walter Seay

"TRS-80 COLOR COMPUTER PRODUCTS"

"ENHANCED 1248-EP EPROM PROGRAMMER"

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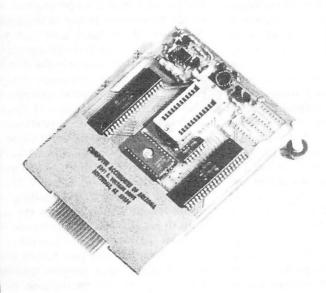
- 1) It has its own "on-board" 25 volt programming supply.
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- 3) Socket for firmware on-board.

A PIA port is also available on the programmer. This 8 bit parallel I/O port with handshake lines, can be used for many applications, such as a parallel printer port. Details on how to use this port as a printer interface are included in the instruction manual.

The instruction manual describes how to take full advantage of the power of this versatile programmer. We think you'll agree, that never before was an EPROM programmer so easy to use, and feature packed as is the 1248-EP.

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Firmware upgrades are available to our previous 1248-EP customers, in EPROM, for just \$29.95.



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Colour Software Workbench — A Pascal Toolbox

By Frank J. Esser

oday, there are a number of diferent compilers on the market for the Color Computer. However, none of these compilers, with the exception of one or perhaps two, supply the user with all the tools necessary to carry program development through from beginning to end. Some implementations require a separate word processor/text editor, while others require the use of someone else's assembler. None of these implementations, to the best of my knowledge support separated module or procedure development.

Colour Software Workbench is a complete PASCAL development environment. By that I mean that the Colour Software Workbench supplies all the items required to completely carry out program development in PASCAL. There is nothing else to purchase or have in your library. It is a tool that can be used by the experienced programmer wishing to program in PASCAL or it can be used by someone wishing to learn to program in PASCAL. However, a word of warning: The user's manual supplied with the Colour Software Workbench is not a tutorial; if you are setting out to learn Pascal, you will need a good general text book.

Colour Software Workbench comes on a 5-1/4-inch diskette. The user manual is bound in a vinyl three-ring notebook. The diskette does not incorporate any protection features and can easily be backed up using the BASIC "backup" command.

The manual that comes with the Colour Software Workbench is of excellent quality and context. It is the opinion of this reviewer that the people at Deft Systems, Inc. took great pains to not only produce programs of very good quality, but they put the same care and attention to details into the sup-

porting documentation. The manual is broken down into three distinct major sections. These sections are: *Introduction, How To* and *Background*.

The Introduction section gives a brief overview of just what the Colour Software Workbench consists of. It also gives the user a brief explanation of each of the processors that make up the development environment. Included with the explanations are excellent information flow diagrams which depict the function of each of the separate processes. One also describes the entire workbench environment.

The *How To* section is broken down into six subsections, 1) Getting Started, 2) Text Editor, 3) PASCAL Compiler, 4) Assembler, 5) Linker and 6) Debugger. Each of these sections gives a good explanation of how to run each of the processors associated with the workbench environment. The introduction section gives the user the necessary information to set up his system so that the workbench will function properly. Also included is a list of the files found on the diskette and a brief explanation of each. At the beginning of each of the sections, the pictorial diagram appears again, showing the flow of information through the processor being explained. Again, as with the first section, the quality of documentation is very good. The section on the compiler, assembler and linker gives an excellent description of the output listings obtained from each processor and what they mean. The debugger and editor sections give an excellent description of the commands available with each of the processors. In addition, the editor section lives a good description of the editor's screen and the extra information it contains.

The Background section is broken

down into three subsections, 1) PASCAL, 2) Advanced PASCAL and 3) Assembler. The PASCAL section is a general programmers guide in that it explains the general functions and constructs of this implementation of PASCAL. It covers such subjects as program structure, constants, types, variables, procedures and functions, expressions and assignments, compound and control statements, input/output, built-in procedures and functions and error messages.

The advanced PASCAL section covers those items found in the Colour PASCAL compiler that are not found in standard PASCAL compilers. Some of these functions are strings, type extensions, absolute memory access, static variable allocation, separate compilation, assembler interface and compiler controls. The assembler section is also a programmer's guide in that it gives a general overview of the 6809 register usage, the addressing modes and a complete instruction set listing with a brief explanation of each instruction. The assembler section covers the subjects of language syntax, 6809 instruction summary, general directives, macros, linkage directives, listing control directives and error messages. Last, but not least, is the tech notes section. This section covers such items as ROM compatibility, PASCAL runtime library variations, file access from assembler, utilities and Colour Software Workbench object file format. Again the documentation is easy to follow and very well written. It most definitely has the professional touch and is first class all the way.

At this point, I would like to give a brief overview of the operation of each of the processors found in the *Colour Software Workbench* and just what they do. The *editor* is the first processor you will be likely to use in the development of any programs under this system. The editor is a full-screen editor in that it presents the user with a full screen of data at one time. It supports screens up to 255 columns wide and unlimited number of lines long. The editor will handle a file size of up to 14,800 bytes.

The screen format is 16 x 32, the standard CoCo screen. A sliding window concept is used to allow the scanning of all possible 255 columns. The window will move right 12 columns at a time. Thus, half the past screen is still present allowing a smooth transition across the line. At the bottom of the screen is displayed a status line which contains some very useful information. The status line tells the user which mode the editor is in, the column and line the

cursor is presently on, the length of the line the cursor is on and last, the amount of text already entered, in characters. The end of each line is marked by an orange block. The end of text buffer is marked with a blue block and the cursor is a black flashing block. The editor has an auto-repeat function which is activated by holding down a key for more than one second. The repeat functions at a rate of six characters per second. I found the one second delay to be a little too short, but the six characters per second to be more than adequate.

The editor supports both upper- and lowercase characters and can be toggled back and forth by using the [SHIFT][0] keys. The cursor is controlled by the four direction arrow keys on the keyboard. The [CLEAR] key is used to invoke editor functions. Such functions are 1) deleting characters, 2) deleting lines, 3) getting and writing files, 4) finding and replacing text patterns and 5) quitting and reentering. Also supported are marking and moving text blocks.

The Pascal compiler is *EXEC*uted or *RUN* by typing in the following command string *LOADM* "PASCAL": EXEC. Once up and running, you are prompted for the following information.

SOURCE: (Name of the source file created with the text editor.)

OBJECT: (Name of the output object file.)

LIST: (Name of the compiler list file.)

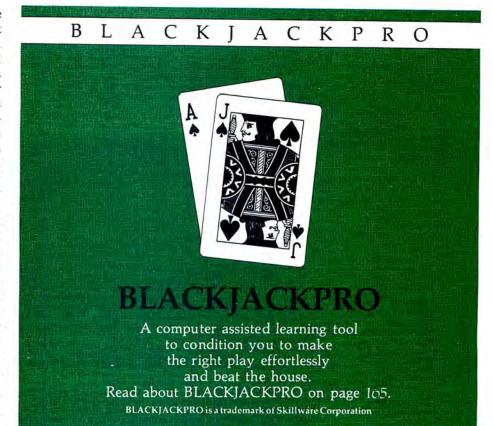
DEBUG?: (Yes/NO — Yes means include the debugger interface.)

DIRECTIVE: (Enter any of the compiler recognize options.)

The compiler will then proceed to read in the source file and generate the machine language object output file and the listing file. Once these steps have been completed, the number of errors encountered are displayed on the screen. If zero errors are indicated, you are ready to link the object with other modules and the run time library.

If errors are present and you choose to put your listings on disk, then you will need the execute the editor and load the listing file to determine the indicated errors. The source file must then be loaded and the corrections made. The file is then resaved and the compiler run again. The process is repeated until the compiler runs error free.

A simple 45-line program I had put together took a little over 15 seconds to



compile. The format of the output listings is very well explained. This version of PASCAL supports all standard PAS-CAL features with the major exceptions being real or floating point arithmetic and pointers. The compiler supports IF-THEN-ELSE, WHILE, REPEAT, FOR, CASE, GOTO, and EXIT control state— Ments. Also supported are standard READ-LN, WRITE, WRITELN, RESET, EOF, CLOSE, AND REWRITE 1/0 statements. The type of files supported are text files and typed files. The functions supported are ABS, CHR, PAGE, C-URSOR, ODD, ORD, PRED AND SUCC. The absence of a floating point arithmetic package limits the range of functions which can be implemented. The non-standard items supported are the following items, 1) string variables, 2) stringcopy, 3) stringdelete, 4) stringinsert, 5) stringpos, 6) encode and decode functions and 7) hex procedure.

K

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The compiler also provides provisions to do screen formatting in a manner which is easier than that used by the BASIC interpretor. Memory cells can be read via the array function. The call function will allow access to the Color Computer's ROM routines and assemble written routines.

Variables can be defined as static or

dynamic. The static variable is one which is defined at the procedure level, accessed locally only, but whose value will not change as the procedure is exited and reenterd. Dynamic variables are just the opposite. Public variables are those variables which are defined in the main module only, and can be accessed from anywhere in the program. A more common term for the public variables would be global variables.

The compiler also supports another very useful feature. That is the ability to perform separate compilations. This function alone can save the programmer hours of time spent in needless compiling of procedures and functions which have not changed since the last compiler run. thus the programmer need only be concerned with the procedure or function being updated. This concept readily supports the principal of top-down design.

A very useful second feature is the COPY statement. The compiler gives the programmer the ability to insert text files into the files being compiled at compilation time. Thus, he does not have to contend with the inserted section of the file during the editing of the present file. Both of these features may



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not seem like much to the novice programmer, but they are very powerful features in the hands of an experienced programmer.

The Assembler supports the entire instruction set of the 6809 microprocessor. Macro language definition is supported and the user guide provides an excellent introduction to the concept of macro programming and the manner in which it is implemented in the Colour Software Workbench Also, the assembler supports such functions as page eject, list/no list, titles/subtitles and space directives. The assembler also supports the COPY statement as explained under the PASCAL compiler paragraph above. The assembler is executed with a LOADM "ASSEMBLE-R":EXEC command, as was the PAS-CAL compiler.

Once the assembler is running you are asked to supply the following infor-

mation.

- 1) TITLE (The title heading which will appear at the top of each page of the assembler listing.)
- 2)SOURCE FILE: (The file containing the program to be assembled.)
- 3)OBJECT FILE: (The file which will contain the assembled data.)

4)LIST FILE: (The file which will contain the assembler listings.)

The linker is a program which will take the output of the assembler and the PASCAL compiler and combine them with the runtime library, and produce a binary output file which is capable of being loaded with the LOADM command and EXECuted. Some of the features of the linker are, 1) object code relocation, 2) automatic PASCAL runtime modules inclusion, 3) built-in symbolic debugger interface, 4) multiple object file input, either interactively or via a control file and inary files. The linker is also executed via the LOADM "LINKER": EXEC command.

Once running, the linker asks for the following information:

- 1) ORIGIN: (The decimal memory address at which the program is to be loaded via the LOADM command.
- 2)LIST FILE: (The file which will contain the link edit map telling how the modules were put together.)
- 3) BINARY FILE: (The file which will contain the EXECutable output of the

linker.)

- 4) PASCAL? (Y): (YES/NO question Answering yes, causes the linker to include the standard PASCAL interfaces.)
- 5) DEBUGGER (Y): (YES/NO question — Answer yes and the debugger interfaces will be included automatically.)
- 6) OBJECT NAMES FILE: (If a control file is to be used, its name is entered here; if not, a null entry is required.)
- 7) OBJECT FILE: (The file which is to be linked. If more than one file is to be linked, the prompt returns until it receives a null response.)

The linker then reads the object files specified, includes the necessary interfaces and gets the necessary modules from the runtime library. All of these elements are then properly linked together and placed on the binary file, the result of which is a file that can be loaded and executed. Again, as before, the chapter contains a sample lising of a link edit map with full explanation.

The symbolic debugger is a program which will The debugger supports a full set of commands which range from display register, swords, bytes, strings, varibles, and hex to modify registers, words, allow bytes, strings and variables. Also included are such commands as clear breakpoints, evaluate, trace, to step, and quit. If the debugger interface is included at link edit time, the debugger is started automatically when the program is loaded and run. If you want to bypass the debugger for whatever reason, simply respond to the debugger prompt with a "go" and it will be bypassed. Once the program is fully debugged another program to be run in a controlled environment, and running as you want it to, the debugger can be removed by simply relink editing the program, only this time responding to the linker prompt with a "NO". The program will get smaller, but will run exactly as it did with the debugger installed.

The Colour Software Workbench will be able to halt execution of the program at items is a complete PASCAL program development called environment. It includes all the necessary tools for the serious programmer to produce good programs with a minimum of effort. For those who are not familiar with PASCAL, I think it provides an excellent enviroto learn it in. The ability of perform file inclusion during both PASCAL

compilations and assembler runs, via the COPY file statement, is in itself a powerful tool. Couple this with the ability to compile singular modules and you nment breakpoints, examine the program contents, alter the conhave a true professional development environment.

I am totally impressed with the professional be examined quality of both the programs and the documentation. They are, in my opinion, excellent.

The package does not support floating le stepped if so point arithmetic, nor does the PASCAL implementation support pointers or relative record files. But, aside from these shortcomings, the rest of the necessary items are there. An excellent example program is included with the workbench. The example program is used to demonstrate the steps necessary to develop programs under the workbench. This program when finished is a text formatter, which will take the output of the text editor and format it any way you might want it. As a matter of fact, the user manual was prepared using the text editor and the included text formatter. Thus, the Colour desired. Software Workbench contains the follwowing items.

- 1) PASCAL Compiler
- 2) 6809 Macro Assembler
- 3) Linker Editor
- 4) Symbolic Debugger
- 5) Text Editor
- 6) Text Formatter

The whole package is quite impressive. I tried twice to reach Deft Systems Inc. to determine what, if any, future additions are in the works for the Colour Software Workbench, but was unable to get a return call. I am totally turned on by the package and find it more than just another PASCAL implementation.

The price may put it out of the reach of many, but I don't think it is priced to high for what one is getting. I do believe that the addition of floating point arithmetic and/or support for random file access would make it an unbeatable package. The package does support all the Color Computer peripherals, such as the printer, screen/keyboard, disks, and cassette recorder. Colour Software Workbench and the Color Computer are a winning team.

(Deft Systems Inc., P.O.Box 359, Damascus, MD 20872, \$150 plus 3% shipping and handling)

-Frank J. Esser

Genesis Software

presents

Arcade Action

★ Q*Man

This is the challenging one! Fast-paced with hi-res graphics. Jump onto the cubes, ride the spinning discs and avoid nasty characters. Requires joystick and 32K machine language areade game.

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The BIG adventure in hi-res graphies. Move through more than 50 scenes on a quest to rescue the captive princess. Decisions are made according to visual clues, not text. There are many inhabitants in the Enchanted Forest—some are friendly, some are not. This is a sophisticated computer adventure—a real challenge. A must for your adventure library. (Enchanted Forest was reviewed in the Dec. 1982 issue of Rainbow), Requires 32K extended basic.

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The BIG adventure continues. The sequel to the popular "Enchanted Forest" is here! You'll move in more than 50 hires, 3-D graphic scenes searching for clues in an attempt to enter the crypt. But beware, the trail to the crypt is beset with puzzlements. In fact, the crypt's secret will remain a mystery to all but the most adventuresome. Requires 32K extended basic.

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* Bigfoot

Hunt Bigfoot in a hidden maze of caverns and twisting tunnels that are displayed in hi-res graphics as you move, Seek out the lair of Bigfoot while avoiding perils along the way. Features multiple levels and many options of play. Each hunt takes place in a new, randomly generated maze. Challenging and fun. (Bigfoot was reviewed in the March 1983 issue of Rainbow). Requires 32K extended basic.

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* The Game Show

Now a lively party game where two teams compete against the clock to name several items in a category. Includes 60 rounds with color graphics and sound. Machine language routine for fast response. (Game Show was reviewed in the Jan. 1983 issue of Rainbow). Requires 16K extended basic and joysticks.

Tape cassette (postage paid).....\$14.95

Personal checks welcome – no delay. Missouri residents add 5.625 percent sales tax.

Genesis Software P.O. Box 936 Manchester, Mo. 63011



Zeus — Electrifying, Action-Packed Fun

Those of us who did not fare well in Greek mythology will find Zeus to our liking because the plot for the action-packed game is quite simple! You have incurred the wrath of "the angry thunder god" and like Achilles, you must be fleet of foot to survive!

You get the idea that a storm is on the way as the credits roll on the screen, accompanied by distant thunder in one of the best opening credits sequences I've seen in a while, rivaling some TV shows.

As the action begins, you are alone on an open plain with only a shield and your "magic staff" to defend yourself. Suddenly, the air is full of lightning bolts which obviously are aimed to eliminate you. You must use the 'cone of cold' generated by your magic staff to blast the lightning bolts out of the air.

After you have survived one storm (or a level of difficulty), however, another one, even more intense, lies ahead. You will find that *Zeus* is relentless, omnipotent and one who never gives up until you are vanquished.

You'll find the first four levels fairly easy after a little practice, especially if you're a veteran of *Centipede* or *Colorpede* wars. The lightning bolts zig-zag from side to side until they're right on top of you. If they get that close, you can pull back on your joystick and, presto, a shield surrounds your body. You can only use the shield once, however.

On the fifth level, clouds appear above and you must avoid standing beneath them because they pack a powerful wallop. As you advance higher, these clouds start moving about, following your every move. It is difficult keeping track of the smaller lightning bolts while those clouds are zeroing in on you.

As you utilize your magic staff to stave off the lightning bolts, a handy meter in the lower lefthand part of the screen informs you of how much power you have remaining. If you use your firebutton for too long, the power quickly drains and you momentarily are defenseless. You soon learn not to get carried away . . . or you will be carried away.

An indicator at the top right shows how many lives you have left. You are granted another life at level five, level nine, and every three levels after that.

Pressing the "P" key allows you to pause at any time. The "R" key lets you re-enter the battle.

The game is fun, the graphics are nice, the sound effects are interesting. However, I wouldn't say that I found it to be even mildly addictive like some of the others I have experienced. And when you have played as many CoCo games as I have since last Christmas, "addictiveness" is definitely a consideration in reviewing a game's possible appeal for others. It also might be argued that such a quality is not necessarily good for your own well-being.

On a scale of 1 to 10, 1 would definitely give Zeus an 8 and hope that lightning doesn't strike!

(Aardvark Limited, 2352 South Commerce, Wallace Lake, MI 48088, \$19.95 tape, \$24.95 disk)

—Charles Springer

The OS-9 experts have developed something new.

C Compiler Version 2 for color computer OS-9 DOS for color computer Relocatable Assembler for Flex and CoCo DOS

C Compiler

Dugger's Growing Systems C is the original C Compiler for the 6809 and is the proven leader in the field. It is a growing subset of the C programming language. It runs in 20K, has assembly language output, position independent code, an extensive library in assembly language source, and code optimizer.

The Color Computer and Flex (which will run on the Color Computer) are now both available with full floating point package (float, long, for, goto, etc.) in addition to the basic C commands. CoCo Dos also contains features which use the BASIC ROM functions (cls, polcat, partial floating point, etc.).

Dugger's Growing Systems has the cost effective C for OS-9. It contains all the necessary C commands (while, if, if else, int., char, etc.) which may be linked, loaded, and used in a multi-user, multi-tasking environment.

Relocatable Assembler

The relocatable assembler package includes assembler, linker, and manager. May be used with the Color Computer or Flex.

Symbols up to 32 characters \square Many special characters allowed in symbols (\$, %, etc.) \square Multiple files assembled without exiting the assembler \square Direct output to printer at any time \square Generates either absolute or relocatable modules which are linked together with RLINK to generate executables \square Supports two types of global variables (VAR and COMN) Fortran type common \square Compatible with source for most assemblers \square Macros with parameters \square Conditional assembly.

Linker

Use text-like files which are generated by RASMB or any other source \square Allows inclusion of multiple source files, each of which can have any number of program modules \square Provide for library files, whose modules are included only as required \square Specify at link-time execution address and global storage area for easy generation of ROM-able code \square Will link together both absolute and relocatable modules \square Extensive linkage information output on request.

Manager



Provide a tool to build a "library" of relocatables

Edit feature to list, insert, and delete modules.

Check and Compare Prices

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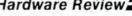
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SPLC-1, Lowercase For The Color Computer

By Jim Reed

The only definite thing I can remember about the first time I pressed [SHIFT][0] to enable the capital and lowercase letters mode on the Color Computer is my response to the inverse video: Yuk!

The first time I saw that inverse mess on the screen, I figured I must have done something wrong. It wasn't much relief to find that it wasn't my fault, because I didn't think I could ever get used to it, even though it appeared I was stuck

Well, now that I am used to inverse video, I still don't care for it—even though I have found a couple of good uses for it. I'll get to those later.

My salvation, until now anyway, has been those word processing programs and other quality software offerings that use the Hi-Res screen to create their own character sets. Now, however, I can have true lowercase in BASIC's character set just by flipping a switch, any time I want to. What a difference SPLC-1 makes!

SPLC-1 is a small printed circuit board that plugs right inside your CoCo, ready for action as soon as you power up. Not only does it provide lowercase, non-inverted characters, but it also makes some needed (and a few unneeded) cosmetic changes in your uppercase as well. The beauty of it, of course, is that it's always there—you don't have to run a program or POKE or EXEC anything to enable it because it's hardwired and working unless you add a switch (or, in my case, two switches) to disable it. More on that. First, let's examine what the SPLC-I does for your BASIC character

The most dramatic difference is that the old (inverse) lowercase is now true lowercase and much easier to read. Yes, true descenders, too. That is, the "tails" on the letters q,y,p,g and j reach below the line. Nice.

As for capital letters and numerals, the most obvious change is that the zero now has a slash in it, just like most printouts. Other changes are more subtle, among them: 1) the crossbar of the numeral 4 has been lowered; 2) the letter O is no longer squared off; it's oval; 3) the S has more curve to it (a big improvement); 4) the question mark is more rounded; 5) the dollar sign has a slash all the way through the s portion; 6) the asterisk looks more like an asterisk; and 7) both the pound sign [#] and the [@] now look like they do on the keyboard.

A few changes I could have done just as well without. Among these: 1) the tips of both the slash and the crossbar in the percentage sign have been trimmed off (personally, I liked them better the old way); 2) the numerals 2, 6, and 9 are more curved (to each his own); but 3) the numeral 3 is less curved and, with SPLC-1, has a flat top (making the upper half look like a z); and 4) the horizontal bars of the left and right brackets are longer even though the documentation says they should now be shorter (perhaps this has to do with my installation being in a TDP-100).

There are also a few special characters: 1) left and right

braces; 2) a vertical bar (the use for which I'm at a loss); 3) a Spanish declarator symbol (~), which is also used in math to denote equivalency; and 4) an alternating dot pattern sometimes used as a delete code in RS-232 data communication.

All in all, the SPLC-1 is a big improvement. Still, while it complicated what is otherwise a simple installation—thanks to quickie instructions for the electronically adept and stepby-simple-step spoon-feeding, illustrated documentation for the novice—I elected to add a couple of switches.

Saturn Software anticipated that some of us would want to tinker around and they provided extra instructions and illustrations for those of us who weren't ready to totally commit to eliminating inverse lowercase. There are separate instructions, depending on what board you have, and while installing the board itself is easy enough, the instructions could be a lot clearer regarding adding the switches. That part of the documentation could stand consolidation and rewriting to eliminate the confusing cross-referencing it currently contains.

While some may find cutting traces and soldering in a few jumps a piece of cake, I'd just as soon the elves at the factory did it, thank you. Adding the switches probably accounts for the occasional RFI present when my SPLC-1 is in use. (Admittedly, however, my CoCo is becoming so modified the RFI could be coming from anywhere.)

So, why was I so determined to have it both ways? Both standard and inverse video. The new character set or the old standard. Well, some software, such as Telewriter-64 and

TIMS, uses the inverse video mode in the menu to denote which letter to hit for what command; those programs look a bit weird if you're using the SPLC-1. That is, instead of the first letter of the menu options being a capital in inverse video, you now have the initial letter of the menu option in lowercase followed by the rest of word in uppercase—eDIT, rETURN, fORMAT, etc. So, it's nice to be able to disable the SPLC-1 and use the inverse video to advantage in those instances.

Another time that inverse video is actually a real advantage is when you're debugging a program you've downloaded from a BBS. I'm sure I'm not the only one who finds that, for whatever reason, occasionally BASIC command words in the listing you've downloaded into your buffer have a few letters in lowercase and, thus, won't run. Well, it's a whole lot easier to spot them with inverse video than with true lowercase.

Two small caveats: while SPLC-1 is a hardware modification that creates a new character set for your text screen, it does not (in case you're new to CoCodom) affect the line printer's character set; that's another matter. Also-as with almost any CoCo improvement—installation of the SPLC-1 voids your CoCo's 90-day warranty.

The SPLC-1. I like it. Too bad it isn't standard equipment on every CoCo; I think anyone will find it a very pleasant added feature.

(Saturn Software, P. O. Box 357, Poway, CA 92064, \$59.95)

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The following products have been recently received by the Rainbow, examined by our magazine staff and approved for the Rainbow Seal of Certification, your assurance that we have seen the product and have ascertained that it is what it purports to be.

This month the Seal of Certification has been issued to:

Business Accounting System, a 32K menudriven accounting system that contains all of the programs required to create, update, and maintain data files and prepare the necessary accounting reports including: a Transaction Journal, a P&L or Income Report, an Interim or Trial Balance, and a Balance Sheet. Mark Data Products, 24001 Alicia Parkway, No. 207, Mission Viejo, CA 92691, disk \$99.95

Paper Tractor, a 9½" x 25" clear plastic device designed to carry any paper (bond, parchment, vellum, onionskin, NCR, sheet music, etc.) through a tractor feed printer. It will hold checks, invoices, letter and legal size paper. It will load like an ordinary typewriter and requires no hardware modification. Paper Tractor, One South Fairview, Goleta, CA 93117, \$11.95

Dyterm, a 16K BASIC program with ML subroutine that converts a Coco into a terminal and allows you to receive and send messages between two computers, another terminal or a modem. Dynamic Electronics, Inc., Box 896, Hartselle, AL 35640, tape \$14.95, cartridge \$24.95

Four Mile Island Adventure, a 16K ECB adventure game. Objective: You are trapped inside a runaway nuclear power plant. Bring the reactor to a cold shutdown and prevent the "China Syndrome." Owl's Nest Software, P.O. Box 579, Ooltewah, TN 37363, tape \$17.95

Valhalla, a 32K ECB strategy game. Objective: Capture and control the opponent's castles and villages while protecting your own. HYCOMP Software, P.O. Box 15331, Tulsa, OK 74158, tape \$24.95

MicroCheckers, a 4K checker game for the MC-10. Objective: Remove your opponent's pieces and be first to victory. Radio Shack Stores nationwide, tape \$8.95

Big File/Fast File, a 16K ECB disk database management system. Includes a 25-page instruction manual. Moreton Bay Software, 316 Castillo Street, Santa Barbara, CA 93101, tape \$59.95

More Business, a 32K ECB small business accounting program with up to 400 accounts payable, 400 accounts receivable, and more than 800 general ledger accounts. It prints invoices, profit and loss statements, and balance sheets. Includes a 130-page manual containing complete index and glossary. Moreton Bay Software, 316 Castillo Street, Santa Barbara, CA 93101, disk \$99.95

Repeat Key, a 16/32K ML utility that provides the CoCo with Automatic Key Repeat. Any key held down for longer than approximately 3/4 seconds is repeated at the rate of 20 times per second. Elite Software, Box 11224, Pittsburgh, PA 15238, tape \$14.95

LLISTER, a 16K ML utility that provides a better formatted listing of BASIC programs (on a printer) than does the BASIC command LLIST. LLISTER provides the following formatting: Breaks each line at 75 columns to leave a right margin; indents continuation lines so that only line numbers will be at the left-most margin; skips over perforations to leave a top and bottom margin of three lines. Elite Software, Box 11224, Pittsburgh, PA 15238, tape \$14.95

Shrink, a 16K ML utility that removes all unecessary spaces from a BASIC program. Elite Software, Box 11224, Pittsburgh, PA 15238, tape \$17.95

Starblaze, a 16K adventure in space exploration game. Objective: As the Commander of a patrol ship, you are responsible for defending the 64 sectors of your galaxy. You must hunt down the aliens and destroy them before they ruin the galaxy's supply stations. Radio Shack Stores, nationwide, ROM pak \$19.95

Micro Color Compac, an ML program which allows your MC-10 to communicate by telephone with an information service (ie, host computer) such as Compu-Serve or Dow Jones, Radio Shack Stores, nationwide, tape \$29.95

Space Escape, a 32K ECB text adventure program. Objective: You have been taken prisoner on an alien spacecraft and you must escape and return home to Earth. Pal Creations, 10456 Amantha Avenue, San Diego, CA 92126, tape \$14.95

Private Investigator, a 32K real-time text adventure/simulation. Objective: You have applied for a job as an assistant private investigator and you must put the real murderer in jail. Pal Creations, 10456 Amantha Avenue, San Diego, CA 92126, tape \$14.95

Ski Lodge, a 32K ECB text simulation program. Objective: You must operate a ski lodge efficiently and make \$100,000 by December 31st. Pal Creations, 10456 Amantha Avenue, San Diego, CA 92126, tape free with purchase of another program.

Mother Lode, a 32K ECB text adventure program. Objective: You have just been notified of an inheritance and must find Mother Lode to find out how much money you will receive. Pal Creations, 10456 Amantha Avenue, San Diego, CA 92126, tape free with the purchase of another program.

Better, a 32K ECB numbers betting game program for 1-4 players. Objective: To make as much money as possible before the game ends. Pal Creations, 10456 Amantha Avenue, San Diego, CA 92126, tape free with purchase of another program.

Eno, a 32K ECB text adventure program. Objective: Your eccentric old aunt just died and left you a fortune and hid it from you. You must decipher the clues given and get the cash. Pal Creations, 10456 Amantha Avenue, San Diego, CA 92126, tape free with the purchase of another program.

Match It, a 32K ECB word game program. Objective: Try and guess the computer's secret five letter word. Pal Creations, 10456 Amantha Avenue, San Diego, CA 92126, tape free with the purchase of another program

Banners, a program designed for use with the CGP-115 printer/plotter that will generate banners of up to 250 characters, in four colors and 39 character sizes. All-American Ultralight Industries, 1144 Kingston Lane, Ventura, CA 93001, tape \$9.95

Test Aid, a 32K ECB utility program which allows the user to create a bank of four-alternative multiple-choice test questions; to edit the questions; to select questions from the bank for inclusion on an exam; to print a formatted copy of the exam, and to generate different orders of items for an exam. Infotools, 111 Country Club Lane, Oxford, OH 45056, tape \$18

Jowst, a 16K arcade type game. Objective: Destroy enemy chickens by striking them from above with your duck. Thundervision, P.O. Box 3241, Grand Junction, CO 81502, tape \$28.95

Troff, a 16K ECB arcade type game. Objective: Play four different games of survival against the computer. Thundervision, P.O. Box 3241, Grand Junction, CO 81502, tape \$21.95

Xebec, a 16K Hi-Res dog fight game in 3-D. Objective: Defeat your enemy with lasers. Thundervision, P.O. Box 3241, Grand Junction, CO 81502, tape \$21.95

VC, a 16K simulation of political/military warfare between guerilla forces (controlled by the computer) and pacification forces (controlled by the player). Objective: To win the hearts and minds of the people, and to cut off and destroy all Viet Cong and North Vietnamese army units operating in your province. Microcomputer Games, A Division of The Avalon Hill Game Company, 4517 Harford Road, Baltimore, MD 21214, tape \$20

Mudpies, a 32K circus-type game. Objective: Maneuver Arnold out of danger's way by throwing mudpies to ward off oncoming clowns, pick up any food that might be around to keep Arnold from getting too hungry, and find an exit to escape through this circus. Computer Shack, 1691 Eason, Pontiac, MI 48054, disk \$29.95

Oracle II, a ML monitor featuring a 10 byte hex or ASCII search, multiple breakpoint control, full screen display and editing of memory, is assembler and a single variable speed stepper that will step both RAM or ROM. It also features the ability to preset the location of both the monitor screen and the graphics screen and the support of all the Color Computer graphic modes and color sets. Micro Majic, P.O. Box 142, Sumner, WA 98390, tape, CoCo Verison \$35.95, Flex Version \$45.95

Order Entry System, a 32K sales order processing system which will give an efficient means to enter orders, print shipping papers and invoices, prepare sales reports, and monitor receivables. An ML program is included with the system to automatically enhance the monitor screen to a 51 character by 24 line display. Up to 900 products may be defined and a single disk system will hold over 600 transactions. Mark Data Products, 24001 Alicia Parkway #207, Mission Viejo, CA 92691, disk \$99.95

Cartridge Dump, a 16K ECB program which allows transfer of most ROM packs to tape or disk and then the programs can be RUN from tape or disk without unplugging the disk controller. Microcom Software, P.O. Box 214, Fairport, NY 14450, tape \$14.95

Colortac, a disk drive tachometer which will measure the speed of your disk drives in r.p.m.'s and gives an indication of the stability of each drive. Sunshine Software, P.O. Box 15686, Panama City, FL 32406, disk \$14.95

Menu, a utility program that will run a directory with 42 filenames on the screen. Programs are selected by arrow keys. Functions include RUN, COPY, RENAME, OFFSET, KILL, EXEC, and addresses of ML programs. Sunshine Software, P.O. Box 15686, Panama City, FL 32406, disk \$24.95

Zaxxon, a 32K ML game for one or two players. Objective: You are the pilot of a fighter spacecraft on a mission to destroy the Zaxxon robot. Radio Shack Stores, nationwide, tape \$34.95

Airline, a 16K strategy game for one to four players. Objective: Construct a sizable empire while competing against human and/or computerized opponents. Players purchase landing rights from any one of 36 major U.S. cities, buy planes and then station them on routes that will maximize the player's revenue from fares. Adventure International, Box 3435, Longwood, FL 32750, tape \$24.95

The Investor, a 16K ECB personal investment portfolio software consists of two programs; Invvpdt which creates and maintains a year-to-date cassette transaction file (Invdata) with up to 175 purchases, sales, dividends and stock splits for up to 24 securities. And, Investor, that analyzes the Invdata file of transactions, gains/losses, rates of return, etc., on individual assets or on a consolidated basis. J&A Enterprises, 74 Meadow Rd., Plymouth, MA 02360, tape \$39.95

Stellar Search, a 32K ECB graphic adventure space game in four parts. Objective: As Captain of the Enterprise you must establish contact with an unknown race while the enemy tries to stop you. Owl-Ware, P.O. Box 116R, Mertztown, PA 19539, tape \$27.95

FICA-83, two 16K ECB programs for calculating your approximate monthly pension check under the 1983 changes to the Social Security Act. The FICA-83S program is used for printout to the TV screen only; it includes a report of the FICA tax rate in applicable years. The FICA-83P program is used for printout to hard copy and requires a printer. Parsons Software, 118 Woodshire Drive, Parkersburg, WV 26101, tape \$19.95

Star Trap, a cooperative/strategy game for ages seven and older. Objective: Chase the shooting star through the maze, learn the powers of the gates, and use your X's to trap the star. Radio Shack Stores nationwide, tape \$19.95

Paint Pot, a 32K ECB program designed for creation of sketches and graphics in four colors. It is designed so that young children can draw right away, yet is powerful enough to satisfy the advanced user. Up to four screens can be stored at one time (three with 16K). There are keys to copy and animate the graphics, plus a help key. Tim Skene, 6073 Durocher Avenue, Montreal, Quebec, Canada H2U 3Y7, disk version \$25

Shenanigans, a 32K Hi-Res graphic adventure game. Objective: Search for the Pot of Gold hidden by leprechauns at the end of the rainbow, avoiding danger along the way. Mark Data Products, 24001 Alicia Parkway, No. 207, Mission Viejo, CA 92691, tape \$24.95, disk \$27.95

The Music Reader, a 32K ECB package of programs for the beginner or persons with some ability in reading music. These seven program utilize the blend of Hi-Res graphics and text to teach you how to read music, identify notes and their lengths, and how to recognize the rests. Musical terms are covered along with measures, time signatures, key signatures (sharps and flats), the piano keyboard and how to translate notes into rhythm. Prickly Pear Software, 9234 E. 30th Street, Tucson, AZ 85710, disk \$39.95

Whole Numbers, an educational program designed to give practice on addition, subtraction, multiplication, and division of whole numbers. Shamrock Software, 4382 Norton Road, Radnor, OH 43066, tape \$9.95

Fractions, an educational program designed to give practice onb addition, subtraction, multiplication of fractions. Shamrock Software, 4382 Norton Road, Radnor, OH 43066, tape \$9.95

Percents, an educational program designed to give practice on finding a percent of a given number, finding the percent one number is of another, and changing a fraction to a percent. Shamrock Software, 4382 Norton Road, Radnor, OH 43066, tape \$9.95

Length, an educational program designed to give practice on changing from one length of unit to a different length of unit and to find the perimeter or circumference of a specific geometric shape given the proper parameters. Shamrock Software, 4382 Norton Road, Radnor, OH 43066, tape \$9.95

Arena, an educational program designed to give practice on changing from one area unit to a different area unit and to find the area of a specific geometric shape given the proper parameters. Shamrock Software, 4382 Norton Road, Radnor, OH 43066, tape \$9.95

Time, an educational program designed to give practice on changing from one time unit to a different time unit. Shamrock Software, 4382 Norton Road, Radnor, OH 43066, tape \$9.95

Sequence, an educational program designed to give practice in putting numbers in proper numerical sequence from smallest to largest. Shamrock Software, 4382 Norton Road, Radnor, OH 43066, tape \$9.95

Capacity, Liquid And Dry, an educational program designed to give practice on changing from one capacity unit to a different capacity unit. Shamrock Software, 4382 Norton Road, Radnor, OH 43066, tape \$9.95

Decimals, an educational program designed to give practice on addition, subraction, multiplication, and division of decimals. Shamrock Software, 4382 Norton Road, Radnor, OH 43066, tape \$9.95

Volume, an educational program designed to give practice on changing from one volume unit to a different volume unit and to find the volume of a specific solid given the proper parameters. Shamrock Software, 4382 Norton Road, Radnor, OH 43066, tape \$9.95

Speed, a program designed to give practice on changing from one speed unit to a different speed unit. Shamrock Software, 4382 Norton Road, Radnor, OH 43066, tape \$9.95

Weight, a program designed to give practice on changing from one weight unit to a different weight unit. Shamrock Software, 4382 Norton Road, Radnor, OH 43066, tape \$9.95 Math Invasion, an educational math game for ages seven and up. Objective: Mathematical mathemati

Keyboard a 16/32K educational program for grades 1-6 designed to help familiarize a student with the keyboard. Home keys are identified and proper fingering is taught. Lessons are built around alphabet, finger, word, and sentence drills. Both 16K and 32K versions can use data tapes for further practice. B5 Software, 1024 Bainbridge Place, Columbus, OH 43228, 16K tape \$19.95, 32K tape \$24.95

Keyboard Phonic Drill, a data tape to be used with Keyboard. Letter, word and sentence finger drills using common vowel and consonant combinations are included. B5 Software, 1024 Bainbridge Place, Columbus, OH 43228, tape \$8.95

Skip Counting, a 16K educational program for grades 1-4 that helps the child learn to count by 1s, 2s, 5s 10s, 100s, or any number desired. The user selects the parameters by giving the number to count by and the beginning and ending number of each sequence. B5 Software, 1024 Bainbridge Place, Columbus, OH 43228, tape \$16.95

The M.A.S. Number-Cruncher, a 16K program which performs the functions of a hand-held calculator. It can be used independently or as a subroutine appended to another financial program, allowing the user to number-crunch on the screen. Moonshot Acres Software, Route One, Box 423, Rockfield KY 42274, tape \$7.95

A/BASIC Compiler; a BASIC compiler for OS-9 and FLEX that generates 6809 machine code from easy to write BASIC source prorams. It is an integer only (no floating point), version of BASIC. It can be used for games and graphics, but it has no built in functions for them. Frank Hogg Laboratory, The Regency Tower, Suite 215, 770 James Street, Syracuse, NY 13203, Object only \$150

DYNASOFT PASCAL, a portable pcode implementation of a Pascal subset specifically tailored for small scale microcomputer systems. DYNASOFT PASCAL is a Pascal Subset which includes the control structures of standard Pascal and supports the data types INTEGER, CHAR, BOOLEAN, scalar (enumerated), subrange, pointer, and ARRAY, along with the dynamic memory management functions NEW, MARK, and RELEASE. Available for CoCo OS-9 and FLEX. Frank Hogg Laboratory, The Regency Tower, Suite 215, 770 James Street, Syracuse, NY 13203. OS-9 Object only \$69.95, with run-time source \$99.95, FLEX Object only \$59.95, with run-time source \$89.95

DYNA-C, a new Small-C derivative for OS-9 and FLEX-9 that produces compact, ROMable, position-independent, reentrant, OPTIMIZED code. Source code for the entire run time system is supplied, so you can customize to your own needs. Requires 36K of user RAM. Frank Hogg Laboratory, The Regency Tower, Suite 215, 770 James Street, Syracuse, NY 13203, OS-9 \$104.95, FLEX \$99.95

DSM, a 6809 Macro Assembler for FLEX and OS-9 with conditional assembly directives and other extended commands. DSM will allow you to support your source code files on one system and can generate OS-9 or FLEX formatted binary object code files under either disk system. Frank Hogg Laboratory, The Regency Tower, Suite 215, 770 James Street, Syracuse, NY 13203, \$99

CRASMB-Macro Cross Assembler, a macro-conditional cross assembler for FLEX and OS-9. It uses machine language overlays or modules called "CPU Personality Modules" to do the work of mnemonic look up. It has directives and other extended commands. It generates OS-9 or FLEX binary files. Frank Hogg Laboratory, The Regency Tower, Suite 215, 770 James Street, Syracuse, NY 13203, Written for 6809 FLEX and OS-9 \$200, CPMs (CPU Modules) \$35 with source \$70, or CRASMB with all CPU modules with source /or FLEX or OS-9 \$499

Cross Assembler Macros, a set of macros for the TSC Macro Assembler (for FLEX) or the OSM Macro Assembler (for OS-9 or FLEX) provides the user with the capability of using a 6800/1/9 computer system for program development for 6800/1, 6805, 6502, 8080/5, and 280 systems, using the assembler language format normally used on the target machine. Frank Hogg Laboratory, The Regency Tower, Suite 215, 770 James Street, Syracuse, NY 13203, OS-9 \$55 each or 3/\$110, FLEX \$50 each or 3/\$100

Super Sleuth, a set of programs which enable the user to examine and/or modify binary program files on disk or in memory on 6800, 6801, and 6809 systems. Z-80 Super Sleuth, this version analyses Z80, 8080, 8085 object programs. Frank Hogg Laboratory, The Regency Tower, Suite 215, 770 James Street, Syracuse, NY 13203, CoCo OS-9 \$49.95, CoCo FLEX \$50, RS DOS \$49, FLEX or OS-9 with Source \$99, Uniflex \$100

6800-6809 And 6809 PIC/PID Translators: The 6800-6809 translator converts 6800/1 assembly-language programs to 6809 assembly language programs by converting 6800/1 opcodes to sequences of one or more 6809 opcodes. Frank Hogg Laboratory, The Regency Tower, Suite 215, 770 James Street, Syracuse, NY 13203, FLEX \$50, UniFLEX \$60, OS-9 \$75

Spooler, a 16K printer spooler program that prints ASCII files from disk without waiting. Chroma Systems Group, P.O. Box 366, Dayton, OH 45420, tape \$11.95 or disk (with source) \$15.95

Here Comes De Prez, a 32K ECB text simulation program. Objective: To win the election for President of the United States. Pal Creations, 10456 Amantha Avenue, San Diego, CA 92126, tape \$14.95

Fun House, a 32K ECB text adventure program. Objective: To find your way out of the fun house. Pal Creations, 10456 Amantha Avenue, San Diego, CA 92126, tape \$14.95

Scatterbrain, a 32K ECB graphic text adventure program. Objective: To place each of the 60 objects in its proper place. Pal Creations, 10456 Amantha Avenue, San Diego, CA 92126, tape \$14.95

Pro-Color-File * Enhanced, a 32K new version of Pro-Color-File 2.0, a database program which offers the ability to track any information such as mailing lists, expense records, inventory or court trials, etc. The features include: defining up to 60 data fields; 1020 bytes per record; use of 1-4 disk drives; four color data entry screens; 28 user defined equations; scans files alphabetically; duplicate records; duplicate fields; eight report formats; summary reports; screen reports; page titles, numbering; sorts any field, three fields at once, or any size field; and selects subsets of file. Derringer Software, P.O. Box 5300, Florence, SC 29502, disk \$79.95

Keyboard "Beeper" Cartridge, a general enhancement device which provides audio feedback to keyboard activity. The ESL "Beeper" was designed to respond with a soft "beep" whenever the BASIC keyboard scan routine detects a valid key closure. Included are: power indicators, version selection, visual activity indicator, switchable interrupt line, extension connector, reset switch, and audio disable. These are all housed in a standard game pack cartridge for installation into the expansion port connector of the CoCo. The user interface consists of four switches, four LED indicators, a piezo audio transducer, and an extension connector at the end of a length of ribbon cable. It is fully functional with any of the substitute keyboards available and requires no software modifications to implement or support the audio feedback feature. ENG Systems Laboratories, 8203 Springfield Village Drive, Springfield, VA 22152, \$59.95

Ernie's Majik Shapes, a skills game for ages three to six. Objective: Ernie wears the top hat but you are the magician. Help Ernie match shapes in six different ways. Radio Shack Stores nationwide, tape \$19.95

Edit/Assemble for OS-9, an editor and assembler package. The edit features "screen-like" line editing capabilities, and assemble is a conditional macro assembler. Frank Hogg Laboratory, The Regency Tower, Suite 215, 770 James Street, Syracuse, NY 13203, \$69.95

Keeptext, a 16K ML word processing program that uses a full screen editor and full featured print formatter, including on screen help facilities. P & M Software Co., 11600 SW Frwy., Suite B-364, Houston, TX 77031, tape \$29.95

Accounts Receivable Program, a BASIC program for one, two, three and four disks, and a BubbleSort routine program designed to help small or large businesses to keep track of accounts receivable files. It also allows you to print out statements from the data. PcLEAR4 Co, P.O. Box 294, Henderson, TX 75653, disk \$49.95

Disk Data Handler Directory-File Builder, a short BASIC program which will read directory information from your disk and build a file of this information which may be read by Custom Software Engineering's Disk Data Handler (DDH). DDH may then be used for any desired sorting, selecting, or reporting. Each file produced may have over 500 directory entries, and DDH (in the 64K configuration) may combine these files to produce an overall index of more than 1,500 entries. Disk Data Handler Directory-File Builder will be supplied as a printed listing to all future DDH 64K purchasers at no additional cost. Old DDH customers may obtain a free copy by sending their program serial number and a S.A.S.E. to Custom Software Engineering, 807 Minutemen Causeway, CoCo Beach, FL 32931

Slay The Nereis, a 16K game. Objective: you are the commander in charge of three minisubs. Maneuver through murky waters destroying schools of fish, manta rays, starfish, jelly fish and the Nereis, a marine creature which excretes a paralyzing poison. Avoid gaseous bubbles and fire missiles to avoid being destroyed. Radio Shack Stores nationwide, ROMpak, \$24.95

Return Of The Jet-I, a 16K game for one or two players. Objective: Guide your speed cycle through the woods avoiding trees, rescuing bears, and destroying enemy riders. When you have successfully gotten through, you must penetrate the Emperial Power Station and destroy the power beam. ThunderVision Software, P.O. Box 3241, Grand Junction, CO 81502, tape \$24.95

Hi-Resolution Screen Package, a screen formatting utility designed to improve the standard 32-character by 16-line text mode display of the CoCo. It provides formats and a true upper-/lowercase character set, allows you to have mixed text and graphic screens or separate text and graphic screens, and it allows standard terminal control characters to be used to control or communicate with the screen just like a standard video terminal. CER COMP, 5566 Ricochet Avenue, Las Vegas, NV 89110, tape \$19.95

Large 3-D Letter Message Displayer, a 32K ECB program that stores and displays over 100 individually formatted messages that are readable to 50 ft. in three selectable letter styles, four colors, and is user selective. HSAC Software, 1 Fourth Street, Farmingville, NY 11738, tape \$29.95

Guess the Animal, a 16K ML artificial intelligence game. Objective: Think of an animal, and this software will try to guess it using your clues as it responds with questions. Elite Software, Box 11224, Pittsburgh, PA 15238, tape \$17.95

Roman Numerals: Arabic Numbers, three 16K ECB programs. Two tutorials which teach the conversion of Roman numerals to Arabic numbers and back again. The third program provides practice in conversion. Moreton Bay Software, 316 Castillo Street, Santa Barbara, CA 93101, tape \$16.95

Golden Voyage, a 24K ECB adventure game. Objective: The king lies near death in the royal palace. You have three days to bring back the elixer needed to rejuvenate him. Journey through the lands of magic fountains, sacred temples, stormy seas and gold to find the elixer. Adventure International, Box 3435, Longwood, FL 32750, tape \$24.95

DYNASTAR Screen Editor/Word Processor, a menu-driven screen editor equally suited to the tasks of program preparation and document processing, with the addition of the optional DynaForm print formatter/mail merge package. For complete word processing, the optional Dyna-Form text formatter provides all the standard features including pagination, headers and footers, single, double and multiple spacing, boldface, double-strike and underline. Dyna Form has its own macro facility with string variables, nested include files, FULL MERGE/PRINT facilities, and automatic generation of Index and Table of Contents. Frank Hogg Laboratory, The Regency Tower, Suite 215, 770 James Street, Syracuse, NY 13203, DYNASTAR for OS-9 or FLEX, \$149.95; DynaForm for OS-9 or FLEX, \$149.95; or both \$275, DYNASTAR—CoCo version, \$90; Dyna-Form—CoCo version, \$90; or both \$175

A Guide To Food Contents, a 32K program that will list the individual serving size and contents by calories, protein, minerals, carbohydrates, vitamins, and water for a given food product. Computing & Fitness, 35080 Chander Avenue #80, Calimesa, CA 92320, disk \$39.95

ELITE*WORD, a 32K ML ECB word processor that has full screen editing functions, a complete set of output format control features, and offers printed output of flexibility for home and business applications. Includes a 48-page instruction manual. Elite Software, Box 11224, Pittsburgh, PA 15238, disk \$59.95

Pyramid of Doom, a 24K ECB adventure game. Objective: An Egyptian treasure hunt leads you into the dark recesses of a recently uncovered pyramid. Recover all the treasures and avoid being put into a long eternal sleep. Adventure International, Box 3435, Longwood, FL 32750, tape \$24.95

Pirate Adventure, a 24K ECB adventure game. Objective: Go from your London flat to Treasure Island, meet up with the pirate and his daffy bird and try to recover Long John Silver's lost treasure. Adventure International, Box 3435, Longwood, FL 32750, tape \$24.95

Mission Impossible, a 24K ECB adventure game. Objective: To complete your mission given by the computer. Adventure International, Box 3435, Longwood, FL 32750, tape \$24.95

Voodoo Castle, a 24K ECB adventure game. Objective: Count Cristo has had a fiendish curse put on him by his enemies. Try and rescue him while avoiding the Voodoo man. Adventure International, Box 3435, Longwood, FL 32750, tape \$24.95

The Count, a 24K ECB adventure game. Objective: You wake up in a large brass bed in a castle somewhere in Transylvania. Find out who you are, what you are doing here and why the postman delivered a bottle of blood. Adventure International, Box 3435, Longwood, FL 32750, tape \$24.95

Strange Odyssey, a 24K ECB adventure game. Objective: You are marooned at the edge of the galaxy and have stumbled upon the ruins of an ancient alien civilization complete with fabulous treasures and uncarthly technologies. Try and collect the treasurers and return home. Adventure International, Box 3435, Longwood, FL 32750, tape \$24.95

Mystery Fun House, a 24K ECB adventure game. Objective: Find your way completely through the Fun House avoiding being kicked out when the park closes. Adventure International, Box 3435, Longwood, FL 32750, tape \$24.95

Ghost Town, a 24K ECB adventure game. Objective: Explore a deserted western mining town in search of 13 treasures avoiding rattlesnakes and runaway horses. Adventure International, Box 3435, Longwood, FL 32750, tape \$24.95

Savage Island—Part One, a 24K multi-part ECB adventure game for experienced adventurers. Objective: Uncover the awesome secret on a small island in a remote ocean. Adventure International, Box 3435, Longwood, FL 32750, tape \$24.95

Savage Island—Part Two, a 24K ECB conclusion to Part One of the same adventure game. Adventure International, Box 3435, Longwood, FL 32750, tape \$24.95

The Seal of Certification program is open to all manufacturers of products for the TRS-80 Color Computer, the TDP-100, or the Dragon-32, regardless of whether they advertise in the Rainbow. By awarding a Seal, the magazine certifies the program does exist, but this does not constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to the Rainbow's reviewers for evaluation.

-Jutta Kapfhammer



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By W. Bert Woofensburger

and Dale Peterson

Greetings!

Now that winter is on top of us, I bet everybody has forgotten what a hot summer it was. I haven't forgotten, though. It was especially hot down here on the farm. I would have to say, in all seriousness, that it's not been a good year for farming. It was so hot, some of the corn tassels began mutating into the shape of parasols. It was so hot, the pigs didn't move. I mean didn't move! Well, pigs need to move; otherwise they stop multiplying. Finally, near the end of the summer, I put air conditioning in the pig house, and that worked just fine. Yes, they did start moving again, and yes, they did begin multiplying again. A lot, in fact. Unfortunately, the controls for the air conditioning were too low. A particularly clever pig, I suspect (I never actually witnessed the act), kept turning the air conditioning down, so that it was always really cold in the pig house. The pigs seemed to thrive on the cold, and so I didn't mind it too much (although it was expensive), but by the time fall came, all the mice had caught colds, and developed ear infections. How did I know they had ear infections? All the mice started running around in circles—a sure sign of ear trouble. It might have been amusing, if it hadn't been so sad. Every time I walked into the pig house, all these mice would scurry around me in circles. The pigs seemed fascinated by the mice, and after a while they started moving in circles too. I had the veterinarian check their ears—no problem there they were just imitating the mice. There was all this circular activity and not much I could do about it. Thus, I went down to my Color Computer in the den, and started experimenting with circles.

You may remember that I have been accustomed to making "circles" by cheating—that is, by defining to my Color Computer. "manysideagons," and hoping that nobody sees the difference. For example:

TO CIRCLAGON REPEAT 24 (FD 10 RT 15) END

I did a lot of experimenting with circles, going back and

forth from the EDIT room to the RUN room. Then I found an easier way—these so-called "variables," where you can put a little ":" before certain parts of a program and after you've done that, you can change the numbers in those parts of the program while in the RUN mode—whenever you wish. You have to name the variable in the title of the program, and use that same name within the program, but other than that inconvenience it seemed pretty useful. So I tried it with my circle formula.

TO CIRCLE :SIDE REPEAT 12 (FD :SIDE RT 30) END

I tried 0, 20, 30, even 40. I found that at the smaller dimensions, (side 20) the circle seemed acceptable. When I got to the larger dimensions, it was clear as day that I was cheating: not defining a circle at all, but a 12-agon. What would happen if I introduced a second variable for the angle? Like this:

TO CIRCLE2 :SIDE :ANGLE REPEAT 12 (FD :SIDE RT :ANGLE) END

Then I tried running a CIRCLE2—which produced nothing. Why? I tried a CIRCLE2 10 40; and a CIRCLE2 20 10; and a few others. Whoops! The problem was, as I thought about it, that the number of times I needed to repeat the forward and turning motion depended directly upon the size of the angle. Repeating everything 12 times is great—as long as the turning angle is 30. Twelve times 30 makes 360, and I guess past experience shows that the turtle needs to be turning a total of 360 degrees to make that circle and return to where it started. I thought and thought. What do I normally do to find out how many times I need to repeat an angle to reach 360? Answer: divide. Divide 30 into 360 and I get 12. Well, could I use the computer to do my dividing for me? Answer (I won't tell you how I found this one out): yes. Try this:

TO CIRCLE3 :SIDE :ANGLE REPEAT 360/:ANGLE (FD :SIDE RT :ANGLE) END

That was great, and it enabled me to experiment with circles very easily. I tried CIRCLE3 20 30; CIRCLE3 30, 40; CIRCLE3 30 10. I discovered what I should have already known: increasing the size of the angle makes the circle smaller, not bigger. At first, all the angles I put in easily divided in to 360—I didn't want to tempt fate and have something go wrong. After a while, I got bolder and decided to tempt fate. I tried to run CIRCLE3 10 17. It looked okay. I ran CIRCLE3 10 18 right over the 10 17; and discovered there was a difference between the two.

I tried a few more numbers—CIRCLE3 20 20; CIRCLE3

(W. Bert Woofensburger ("Uncle Bert") manages his own hog and corn farm near Ypsilanti, Mich. He has recently acquired a Color Computer and is learning LOGO. Woofensburger's editor and assistant, Dale Peterson, writes for a living, and his recent books include "Genesis II: Creation and Recreation with Computers" and "Intelligent Schoolhouse: Readings On Computers and Learning." He is currently working on a book about Color LOGO with Don Inman and Ramon Zamora, to be published in 1984.)

60 60; CIRCLE3 20 90; CIRCLE3 90 120; and demonstrated once and for all that these "circles" are not really circles at all, but manysideagons. Yes, and thank you Catherine: that little ninny really can't make a circle.

* * *

Now for something different. I got tired of dealing with lines, and decided to add a fancy brush stroke to my turtle's palette. I created the brush stroke in the following manner.

TO HALFVINE

RD6RT30

REPEAT 6 (FD 4 RT 20)

RT 60

REPEAT 6 (FD 4 RT 20)

RT 30

END

TO OTHERHALFVINE

FD 6 LT 30

REPEAT 6 (FD 4 LT 20)

LT 60

REPEAT 6 (FD 4 LT 20)

LT 30

END

TO VINE

HALFVINE OTHERHALFVINE

END

TO GROWVINE

REPEAT 10 (VINE)

END

That was great fun. I thought next I'd try sending the vine in a circle. I looked at some of my earlier circles, and decided to try this:

TO CIRCLEVINE REPEAT 12 (FD 10 VINE RT 30)

END

That was neat. However, it still wasn't quite what I wanted. I wanted those leaves to be packed tightly together, just as they are in a real vine. As the instructions had it, the turtle moved forward 10, did a "vine" then turned and moved again. What would happen if I cut out the forward motion, and just had it depend on the little forward motion inside the vine procedure? Like this:

TO CIRCLEVINE2

REPEAT 12 (VINE RT 30)

END

And this:

TO CIRCLEVINE3

PC 1 REPEAT 30 (VINE RT 12)

END

Well, after that I got brave and decided I would try to do some circlevines using the kinds of variable procedures I had just been messing with. I knew right away how my angle variable would work; all I had to do was specify: ANGLE. But how could I specify the side length? After all, the side length I had just been using was the standard length of one section of vine. I thought and thought and came up with the



idea that maybe I could define my side length like this: REPEAT:SIDE (VINE). With that instruction, the length of a side would just be a number I had chosen for my variable multiplied times the original length of one section of vine. Make sense to you? Anyhow, it seemed a little complicated, because my procedure for a circle had one REPEAT in it to begin with, and this would mean sticking a repeat inside of a repeat. Would it work? I tried it:

TO CIRCLEVINE4 :SIDE :ANGLE
REPEAT 360/:ANGLE (REPEAT :SIDE (VINE)
RT :ANGLE)
END

I tried it with several combinations of numbers. CIR-CLEVINE4 10 10 was like a jungle. Maybe the angle was too small. I tried a more modest CIRCLEVINE 4 10 60. Still a jungle. I had to remind myself that the length number (10) was not the same as the usual length for a turtle move, but was really 10 times the length of a single section of vine. So I tried a more modest length, with CIRCLEVINE4 3 60. That was interesting; I got a vined "sixagon," just as I should have expected. I tried CIRCLEVINE4 2 30 for something closer to a circle. I also tried a square: CIRCLEVINE4 6 90. Next, I decided to get fancy. I added color, and flipped the vinedesign around:

TO DEVINE :SIDE :ANGLE
PC 1 CIRCLEVINE4 :SIDE :ANGLE
LT 180
PC 2 CIRCLEVINE4 :SIDE :ANGLE
END

I was getting a headache with thinking about all these variable ideas, so I decided just to goof off:

TO GOVINE
PC 1 LT 30
REPEAT 100(VINE)
END

TO GOGOVINE
LT 45
REPEAT 50 (PC 1 VINE PC 2 VINE)
REPEAT 100 (PC 3 VINE)

I was getting mighty impatient with the turtle—he or she seemed so slow. Just at that moment, though, the mailtruck came to the door with a big sack of mail from my readers. What do you think the first letter I opened said? It was from Sharon S. of Hingham, Mont. She said: "If you hide the turtle (HT), it'll go faster." So I tried it:

TO GONEVINE
HT LT 45
REPEAT 100 (PC 1 VINE)
LT 45
REPEAT 21 (PC 0 VINE)
LT 45
REPEAT 35 (PC 2 VINE)
FND

Nice. And, having mastered variables, I figured I would try some of these, as icing on the cake:

TO GV :NUM :ANG1 :ANG2 :ANG3 HT LT :ANG1 REPEAT :NUM (PC 1 VINE) LT :ANG2 REPEAT :NUM (PC 2 VINE) LT :ANG3 REPEAT :NUM (PC 0 VINE) END

By that time I had had enough of circles and vines and everything else. I was tired. I lay down on the couch for just a moment, and fell asleep. Next thing I knew, it was tomorrow. Well, I have a lot more to tell you, but I hear thunder—Bertha must be calling. I remain,

Uncle Bert

P.S. Mr. Bob V. D. P. of Edmonton, Alberta has come up with a way to get hardcopy printouts of turtle pictures from his disk system. I haven't tried it out because I only have a cartridge, but Bob's handwriting looks honest. Here it is:

Before loading LOGO type in the following: POKE 113,0 [ENTER]

Now LOADM"LOGO" and *EXEC* the program. When you have your masterpiece finished, press the reset button on the back of the computer. You should now get the Disk BASIC Copyright notice. Now type in:

FILES 0 [ENTER]
To see your picture, run the following program:

10 PMODE 40,0 20 SCREEN 1,0 30 GOTO 30

This picture can be saved to a disk with the following

SAVEM "PICTURE", 3072, 9216, 0 [ENTER]
It can be loaded back with the following program:

10 PMODE 4,0 20 SCREEN 1.0

30 OF=PEEK(188)*256+PEEK(189)-3072

40 LOADM"PICTURE", OF

50 GOTO 50

Since we are loading the picture in with an offset, it should end up at the normal graphics screen location without the FILES 0 command. This picture can be sent to a printer using the appropriate screen dump utility. Some utilities may expect the screens to start at memory location 3584. If this is the case with yours, save the program to disk, then reload it with the program given above. Everything should be okay now.

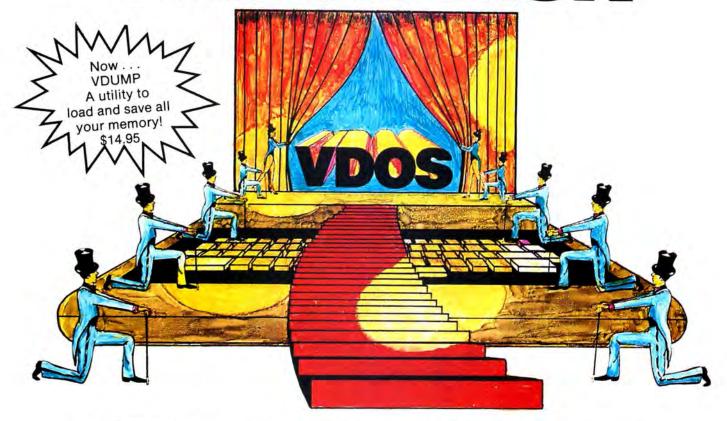
P.P.S. You can send your cards and letters to me in care of my good friend Dale Peterson. Just address them like this:

Uncle Bert Woofensburger c/o Dale Peterson the Rainbow 9529 U.S. Highway 42 P.O. Box 209 Prospect, KY 40059

Hint . . .

Bob Rosen of Spectrum Projects offers this tidbit: "To show the most memory in a Color Computer, type CLEARO: POKE 32,0 and [ENTER]." Then, when you type? MEM, a 32K or 64K CoCo will report 32754! A 16K will indicate 16370. This moves the pointers used by the MEM command to the bottom of RAM where total memory is displayed; however, this additional memory is not usable.

THE UN-DISK



UN-BELIEVABLE

But true! There is a disk drive in your Color Computer... and it is faster and more efficient than any "hardware" drive you can buy, for any price. This new "disk drive" is called VDOS—for Virtual Disk Operating System—and it will absolutely revolutionize the way you operate your CoCo.

VDOS lets you use the "extra" memory inside your CoCo as a virtual disk, with programs (any programs) stored out of the way. You can "save" and "load" programs from your in-memory disk into working memory, and then run them. When you're done, you can simply access your in-memory disk again . . . and save or load another, and another.

And VDOS is fast.
Because you are using memory rather than a mechanical device (like a disk drive or cassette player), programs load instantly. Yes, VDOS is faster than a disk!

VDOS works with all Color Computers—from 16K non-extended to 64K extended. Obviously, the more memory you have, the greater number (and length) of programs you can store. For a 64K system, VDOS also uses the "unused" part of memory, providing up to 50,000 bytes of storage! Now, that's some disk!

We call it VDOS because in the future there will be utilities for your VDOS UNDISK that will give even greater capabilities—such as a full one-pass memory dump to cassette. Other utilities are planned, too.

We believe VDOS is the

greatest advancement for CoCo since the introduction of the disk drive itself. And, at less than \$100, it is so inexpensive you can't afford to be without it. If you have the "cassette blues," VDOS is the answer!

Finally, VDOS is simple to operate. It is entirely self-prompting and comes with a complete manual. But you almost don't even need the instructions—it requires absolutely no technical expertise.

VDOS. The answer to your prayers.

Cassette: \$49.95 Add \$1.50 shipping and handling; Canadians add \$5 for shipping; Foreign points add \$9. VISA and Master Card accepted. All Kentucky residents add 5% sales tax. Payments accepted in United States currency only.



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Give us your best: Join the ranks of these courageous CoCoists in showing the Color Computer world your high score at your favorite micro-diversion. We want to put your best effort on record in the Rainbow's Scoreboard column. All entries must be received by the first of the month to be eligible for the following month's Scoreboard. Each individual is limited to three score entries pe Scoreboard, c/o the Rainbow.

ALCATRAZ II (Spectral Associates) 18,790 **Chris Sweet, Harvard, MA 8,710 Kanti Dinda, Kingston, Ontario ANDROID ATTACK (spectral Associates) *Wes Hill, Vashon, WA Cameron Amick, Reisterstown, MD 25,000 15,500 ASSAULT (Computer Shack) 1,100 *Kevin Mesecher, Ft. Walton Beach, FL ASTEROID ★Matt McMann, New Boston, MI 2,322 **Matt McMann, New Boston, Mark Data) 158,000 **Larry Plaxton, Medley, Alberta 157,000 **Scott Drake, Pine City, NY 104,464 **Jim Baker, Florissant, MO 98,000 **Tim Warr, Bellingham, WA 98,000 **Harry Sawyer, Watchung, NJ AVENGER (The Cornsoft Group) 32,285 24,575 4,675 4,6310 BIRD ATTACK (Amount of the cornsoft Group) **Kentucky Wonder Bean **Acetucky Wonder Bea BIRD ATTACK (Tom Mix) 306,050 Lenny Munitz, Bellerose, NY 200,725 110,850 Peter Niessen, Carlisle, MA Chris Sweet, Harvard, MA 66 425 Brad Widdup, Dundas, Ontario 105 105 **Matt McMann, New Boston, Mill Computerware) 387,800 **Tim Ellis, Overland Park, KS 286,900 **Rom Moore, Greensburg, PA 282,500 **Kevin Delisle, N. Adams, MA 153,825 **Greg Redden, Halifax, NS 142,175 **Joey Ray, Durham, NC 134,550 **Wesley Bull, Vanscary, Saskatchewan Ray, Son Beniek, Rice, MN 79,000 **Kathy Wiggenhorn, Coral Springs, FL STOLLT (Radio Shack) *Matt McMann, New Boston, MI 79,000 Kathy Wiggennorn, Coral Springs, 1989 BUSTOUT (Radio Shack) 42,000 ★Derrick Kardos, Colonia, NJ 34,700 Sara Hennessey, Golden Valley, MN 28,720 Perry Denton, New Baden, IL 7,880 Mike Wells, Pittsburgh, PA 18,403 Brad Widdup, Dundas, Ontario BUZZARD BAIT (Tom Mix) *Richard Buttermore, Grand Rapids, MI 267,700 235,670 Kentucky Wonder Bean Chris Alexander, Grand Rapids, MI 217,800 217,750 Doreen Buttermore, Grand Rapids, MI 187,850 Steve Sentell, Seymour, TN George Endicott, Huntsville, AL 185,050 116,450 116,450 Steve Sentell, Seymour, TN 102,050 Bill Jordan, Nashville, TN CANYON CLIMBER (Radio Shack) **MANDE Wagner, Bangor, PA Randy Hankins, Tabor, FL Bart, Tabor, FL Donut, Tabor, FL Gordy Dow, Bellevue, WA Tim Wiechmann, Marblehead, MA 999,900 615,500 615,500 612,100 163,000 150,000 CATCH 'EM (Aardvark) ★Craig Edelheit, W. Bloomfield, MI 237,000 Dean Bouchard, Kingston, N.S. Kirk Beler, Taber, Alberta Laura Sandman, Louisville, KY 91,000 70,157 65,768 CATERPILLAR (Aardvark) 180,627 86,304 475,861 Michael McCliure, Goose Creek, SC G3,100 54,608 CAVE HUNTER (Mark Data) 42,600 40,600 27,050 26,300 Mike Hughey, King George, VA Jim Baker, Florissant, MO Jensey Agreement Company Comp CATERPILLAR (Aardvark)

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	1,597,701	
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	355,440	Bette Munitz, Bellerose, NY
	DOUBLEB	ACK (Radio Shack)
	1,080,000	★Phillipe Duplanties, St. Jerome,
	000.002	Quebec
	605,890	
	474,040	Paul Moritz, Butte, MT
	435,570	
	429,000	Steve Damm, Phoenix, AZ
		MUNKEY (Intellectronics)
	3,214,200	*Rich McGervey, Morgantown, WV
	1,924,000	Andrew Herron, High Point, NC
	1,679,400	
	1,618,800	Bryan Bloodworth, Federal Way, WA
	1,437,200	
		E (Ace Soft Computer Products)
	23,782	★Philip Deen, Enterprise, FL
	93	Marie Love, Columbia, SC
		ER (Adventure International)
	113,880	★Steve Skrzyniarz, Tacoma, WA
	89,260	
	74,640	Cameron Amick, Reisterstown, MD
	FLYBY	Charles that the arrest to
	4,820	
	4,480	
	3,875	
	3,670	
		(Tom Mix)
	73,350	
	69,710	
	66,480	Jeannie Hawkins, Deltona, FL
	46,560 EDOGGED	Eileen Kaakee, Royal Oak, MI
	63 800	(The Cornsoft Group) Carmen Thew, Surrey, B.C.
	32,000	Olaura Schooley Dishmond VA
	32,010 25,425	Laura Schooley, Richmond, VA
	20,745	Kanti Dinda, Kingston, Ontario
	19,485	Felicia Schooley, Richmond, VA
	EPOG-MA	Rona Kleefman, Deha, B.C.
	3 725	N (Computer Island) ★Aaron T. Cincotta, Peru, IN
	FROG TRE	K (Oelrich Publications)
	14,700	
	14.080	★Greg Burke, Kenora, Ontario Alan Weiss, Summit, NJ
	11,200	Jim Partridge Clinton CT
	10,370	Jim Baker, Florissant, MO
	8,550	Tom Eberhardt, Fairview Park, OH
		nputer Shack)
	83,500	*Hans Haimberger, Milton Freewater,
	100,000	OR .
	54,300	Hans Haimberger, Freewater, Ontario
		ATTACK (Radio Shack)
	67,750	*Chuck Gaudette, Monroe, CT
	58,000	★Chuck Gaudette, Monroe, CT Terry Steen, San Bernadino, CA
	55,360	Donald Thompson, Lubbock, TX
	54,200	Donald Thompson, Lubbock, TX Mike Hughey, King George, VA
	54,000	Craig Edelheit, W. Bloomfield, MI
	26,350	Craig Edelheit, W. Bloomfield, MI Mike Long, Kent, WA
	19,910	Paul Campbell, Richland, MI
	11,840	James Andrew, Kissimmee, FL
		TAX (Spectral Associates)
	104,550	★Mitch Hayden, Univ. of MN
	82,650	*Mitch Hayden, Univ. of MN. Steve Hargis, Tucson, AZ
	73,000	Wes Hill, Vashon, WA
	66,750	Wes Hill, Vashon, WA Jim Wolf, South Bend, IN
	65,700	Steve Otis, Graham, WA
	50,050	Richard Wasseiman, Brooklyn, NY
		The second secon

LUNAR ROVER PATROL (Spectral Associates)

45,500

28.200

26,400

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3.650 *Michael McCafferty, Idaho Falls, ID 3,650 *Michael McCafferty, Idaho Falls, ID ICEMASTER (Arcade Animation)
121,775 *Saul Munitz, Bellerose, NY INVADERS REVENGE (Med Systems)
1,334,300 *Richard Grondin, Flint, MI
502,360 John Osborne, Kincardine, Ontario
32,600 Harry Sawyer, Watchung, NJ
16,300 Eric Lund, Millington, NJ
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144,200 Rich Van Manen, Grand Rapids, MI
96,200 Johnny Fritsch, Whitehall, PA
KATERPILLAR ATTACK (Tom Mix) *Jamie Gritton, Irvine, CA

Andy Truesdale, Ferguson, MO
Jamie Gritton, Irvine, CA
Jennifer Parry, Batavia, IL 163,526 109,247 20.530 14,375 Norbert Berenyi, Northvale, NJ
14,000 Tim Brown, Clio, MI
8,057 Saul Munitz, Bellerose, NY
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55,000 Paul Morris, Richland, WA
49,900 Mark Raphael, Englishtown, NJ

Jeff Teague, Noblesville, IN

Scott Jackson, Littleton, CO Larry Sandhaas, Springfield, IL Don Hammack, Lonbg Beach, MS

Rip Loomis, Long Beach, MS Doug Burke, Kenora, Ontario Jamie Gritton, Irvine, CA

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474,250 Mike Rausch, Denver, CO
469,400 Jeff Jackson, Littleton, CO

30,450

462,100

183,050

171,100

129,700

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15,999 Ed Mitchell, Ragged Mountain, CO Aleisha Hemphill, Los Angeles, CA Ryan Van Manen, Grand Rapids, MI Paschal Wilson, Kentwood, LA Don Hammack, Long Beach, MS 14.297 13,852 13.505 5,680 MEGAPEDE (Computerware)
94,085
89,036
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67,605
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58,070
Rich Van Manen, Grand Rapids, MI
55,291
Ryan Van Manen, Grand Rapids, MI METEOROIDS 140,210 (Spectral Associates) *Fred Iha, Columbus AFB, MS METEORS 403,000 17,810 *Jimmy Chan, Kincardine, Ontario Lenny Munitz, Bellerose, NY Jennifer Klamp, Winter Park, FL MICROBES (Radio Shack) *Hwan Joo, Weston, Ontario 318,830 Steve Mayer & Keith Seifried, Greenville, OH Sheila Coleman, Griffin, GA Rick Van Manen, Grand Rapids, MI 316,200 259,700 258,150 244,700 61,000 Ian Waters, North Hero, VT Mike Long, Kent, WA MR. MUNCH 1,210 Susan Brink, Portage, MI
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61,720 Paschal Wilson, Kentwood, LA MOON HOPPER (Computerware)
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142,800 Ron Rhead, Willowdale, Ontario 122,500 Donut, Tabor, IA Bart, Tabor, IA 111,690 Bart, Tabor, IA
111,690 Randy Hankins, Tabor, IA
105,440 G.I. Jody, Tabor, IA
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2,344 Cameron Amick, Reisterstown, MD NERBLE FORCE (Computerware) 315,150 49,200 *Frank Bottini, St. Louis, MO Jim Ganninger, Des Peres, MO Daniel Milbrath, Ann Arbor, MI Jeff Willard, Chireno, TX Rip Loomis, Long Beach, MS Don Hammack, Long Beach, MS Perry Willard, Chireno, TX 46,400 32,900

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Michael J. Garozzo, Morrisville, PA

Stanley Sneed, Erwin, TN

Robert Lang, Port McNeill, BC

Dave Lubnow, Sussex, NJ

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Susan Brink, Portage, MI
Fred Iha, Columbus AFB, MS
Cameron Amick, Reisterstown, MD
Norbert Berenyi, Northvale, NJ PACET-MAN 26,800 14.050 7,200 5 000 PARACHUTE JUMP (JARB Software) 451,000 \$\frac{1}{4000} \ \text{Mohn Osborne, Kincardine, Ontario} \\
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33,545 \quad \text{Bruck Kothmann, Pittsburgh, PA} \\
PHANTOM SLAYER (Med Systems) \\
2,488 \quad \text{Troy Messer, Joplin, MO} \\
1,852 \quad \text{Curtis Boyle, Saskatoon,} \end{array} Saskatchewan 1 306 Marc Hassler J. Powell, Bournemouth, England 604 406 Imre Kertesz, Chandler, AZ PICNIC (Computer Island)
100,000 ★Scott Drai
1,220 Jon Bauch ★Scott Drake, Pine City, NY
Jon Bauch, South Fallsburgh, NY 2,111,900 Dale Westmoreland, Lannon, WI
1,266,250 Donut, Tabor, IA
300,250 PLANET INVASION (Spectral Associates)
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36,050 Darren Niranyan, Oswego, NY
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Hwan Joo, Weston, Ontario
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Sheri Munitz, Bellerose, NY
adio Shack) 6,455 4,970 4 950 4,865 4 860 4.555

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Mike Wells, Pittsburgh, PA Johnny Fritsch, Whitehall, PA

Scott Sehlhorst, Columbia, SC Cameron Amick, Reistertown, MD

POPCORN (F

168 680

110.570

31,220

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MORE...

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200

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Dan Burner, Fowler, FL

180

W. Knight, Mt. Hermon, CA
Lee Perkins, Norfolk, VA

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53,520
53,400
Ed Bottini, St. Louis, MO
20,910
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19,400
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17,325
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Donut, Tabor, IA
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88 Mike Rausch, Denver, CO SCARFMAN (Cornsoft) SCARFMAN (Cornsoft)
495,440

*Woody Farmer, Alberta, Canada
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121,600

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SEA DRAGON (Adventure International)
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9Steve Skrzyniarz, Tacoma, WA
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23,750
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72,000 Marc Hassler
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595

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16,500 Chris Leek, Martintown, Ontario
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328,000
62,551
Chris Coyle, Selden, NY
80,602
Beth Walker, Gloucester Pt., VA
Dennis Teague, Noblesville, IN
J.W. Pank, Noblesville, IN 113,450 80,001 Darren Noranyan, Oswego, NY Alan Lewis, Ridgefield, CT STARFIRE (Intellectronics)
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380,000 Cameron Amick, Reisterstown, MD
312,000 Dave Lubnow, Sussex, NJ
63,415 Rip Loomis, Long Beach, MS
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Cameron Amick, Reisterstown, MD
TEEEDFFF (Prickly-Pear Software)
32 Mark Wright, Tipton, MI 32 **Mark Wright, Hipton, Mil
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104,456 Robert Cattral, Ottawa, Ontario
104,368 John Osborne, Kincardine, Ontario Dan Burch, Louisville, KY Bruce March, Barrie, Ontario William Delanpree, Millbrae, CA Joyce Isbell, Toccoa, GA 96.800 80,000 9 5 1 8 9,518 Joyce Isbell, Toccoa, GA

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2,291,100 Mike Sitzer, Roslyn, NY
2,657,350 Brian Panepinto, Spencerport, NY
2,152,150 Greg Scott, Orlando, FL
1,769,400 Todd Hauschildt, Red Wing, MN

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98,400 Dann Fabian, Crestview, FL
Dave Lubnow, Sussex, NJ
17,600 Darren Noranyan, Oswego, NY
David Shelby, St. Albane, WV
WILDCATTING (Radio Shack) 3 (Radio Shack)

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Michael Rosenberg, Prestonsburg, KY

Gary Jones, Dale, TX

Matt Buist, Bangor, PA

Andre Wagner, Bangor, PA

Kay Jinkich, Pittsburgh, PA 48,682 42,782 30,555 29,854 29,137 28,842 ZAKSUND (Elite Software)
1,128,050 *Richard Minton, West Frankfort, IL Hichard Minton, West Frankfort, IL Andy Mickelson, Granville, OH Michael Rothman, Solon, OH Steve Schweitzer, Sewell, NJ John Osborne, Kincardine, Ontario Christopher Lee, Canton, OH 1,008,100 950,500 910,000 876,200 ZAPEM (Chromasette) 12,950 *Mic
ZAXXON (Datasoft) ★Michael McCafferty, Idaho Falls, ID ★Roland Hendel, Mississauga, Ontario James Quadarella, Brooklyn, NY 2,000,000 James Quadarella, Brookiyn, NY Mike Hughey, King George, VA Chris Coyle, Selden, NY Rich McGervey, Morgantown, WV Brad Gaucher, Hinton, Alberta Roger Buzard, Lima, OH Jeff Weeks, Hinton, Alberta Roadel Welley, Chapta MV 401,900 370,400 235,200 122,900 94,600 Randell Walker, Dunbar, WV Derrek Davis, Alexandria, VA Jim Partridge, Clinton, CT 92,700 64,200 61,700 Jim Pa ZERO G (Chromasette)

Michael Foley, N. Quincy, MA

19,735

9,700

6,120

5 200

SKY DEFENSE (Quasar Animations)
9,700 Vince Lok, Mississauga, Ontario

Mike Anheluk, Fall Creek, OR Steve Skrzyniarz, Tacoma, WA

Cameron Amick, Reisterstown, MD

MC-10 Memory Map

H. Allen Curtis

his comprehensive mapping of MC-10's memory was inspired by Bob Russell's "Color Computer Memory Map" (July, August, September and December issues of the Rainbow). Russell's memory map not only was an inspiration, but was also heavily relied on as a guide in the compilation of the MC-10 memory references.

There are still many important unmapped locations awaiting your discovery, especially those associated with input/output. I would be most appreciative of your informing me of your discoveries and possible corrections so that the MC-10 memory can expand and improve.

The map covers two areas of memory: RAM reserved for BASIC's use, and the ROM. The map has three headings: Hex, Decimal and Description. Hex specifies the mapped address or addresses in hexadecimal notation. Decimal refers to the same addresses, but in decimal. Under the Description heading, the function, operation or use of the specified address is described. All addresses and contents referred to under Description are specified in hexadecimal.

(H. Allen Curtis, who earned degrees from the College of William and Mary, M.I.T., and Harvard, recently won an award for meritorious service from the IEEE Computer Society. He has had published a college reference book in the computer science field, as well as many papers and articles.)

НЕХ 0082	DECIMAL 130	DESCRIPTION General counter
0084	132	String flag
0093-0094	147-148	Address of start of BASIC program
0095-0096	149-150	Address of start of variables storage; address-l is end of BASIC program
0097-0098	151-152	Address of start of arrays storage
0099-009A	153-154	Address of beginning of free memory used in NEW command
009B-009C	155-156	Address of start of string pool and BASIC stack
009D-00 9 E	157-158	Address of BASIC limit
009F	159	Pointer to string in string pool
00Al-00A2	161-162	Highest available RAM address
00AD-00AE	173-174	Pointer to values in DATA statements
00BB-00C2	187-194	Scratch area used in garbage collection routine and move memory block routine Data for block move: 00BB-00BC high end destination address 00BD-00BE high end source address 00BF-00C0 low end destination address 00Cl-00C2 low end source address

DECIMAL

DESCRIPTION

HEX

HEX	DECIMAL	DESCRIPTION
E000-E02F	57344-57391	Table of pointers to subroutine entry addresses associated with BASIC Key Word Table found at EOEE-E146
		Contents For Function
E000-E001	57344-57345	F2BA SGN
E002-E003	57346-57347	F335 INT
E004-E005	57348-57349	F2D5 ABS
E006-E007	57350-57351	4215 USR
E008-E009	57352-57353	F62A RND
E00A-E00B	57354-57355	F54D SQR
E00C-E00D	57356-57357	FOB9 LOG
E00E-E00F	57358-57359	F5C9 EXP
E010-E011	57360-57361	F68C SIN
E012-E013	57362-57363	F686 COS
E014-E015	57364-57365	F6D2 TAN
E016-E017	57366-57368	EF5F PEEK
E018-E019	57368-57369	EE82 LEN
E01A-E01B	57370-57371	ECED STR\$
E01C-E01D	57372-57373	EF1C VAL
E01E-E01F	57374-57375	EEA2 ASC
E020-E021	57376-57377	EE8E CHR\$
E022-E023	57378-57379	EEAD LEFT\$
E024-E025	57380-57381	EEC8 RIGHT\$
E026-E027	57382-57383	EECF MID\$
E028-E029	57384-57385	FB9C POINT
E02A-E02B	57386-57387	FC11 VARPTR
E02C-E02D	57388-57389	FBED INKEY\$
E02E-E02F	57390-57391	ECDB MEM
E045-E189	57413-57737	BASIC Command key word - token
		table with ASCII characters
E045-E047	57412 57425	Contains string converted to token
E045-E047	57413-57415	FOR 80
E046-E048	57416-57419	GOTO 81
E051-E053	57420-57424	GOSUB 82
E051-E055	57425-57427 57428-57429	REM 83
E056-E059	57430-57433	IF 84
E05A-E05E	57434-57438	DATA 85
E05F-E060	57439-57440	PRINT 86
E061-E065	57441-57445	ON 87
E066-E068	57446-57448	INPUT 88
E069-E06C	57449-57452	END 89
E06D-E06F	57453-57455	NEXT 8A DIM 8B
E070-E073	57456-57459	DIM 8B READ 8C
E074-E076	57460-57462	
E077-E079	57463-57465	LET 8D RUN 8E
E07A-E080	57466-57472	RESTORE 8F
E081-E086	57473-57478	RETURN 90
E087-E08A	57479-57482	STOP 91
E08B-E08E	57483-57486	POKE 92

HEX	DECIMAL	DESCRIPT	ION		HEX	DECIMAL	DES	CRIPTION	
		Contains string	converted to token	11					
E08F-E092	57487-57490	CONT	93	11			Contains str	ing converte	d to token
E093-E096	57491-57494	LIST	94		E138-E13D	57656-57661	VARPI	PR .	C6
E097-E09B	57495-57499	CLEAR	95	11	E13E-E143	57662-57667	INKEY	\$	C7
E09C-E09E	57500-57502	NEW	96	11	E144-E146	57668-57670	MEM	1	C8
E09F-E0A3	57503-57507	CLOAD	97	11					
EOA4-EOA8	57508-57512	CSAVE	98		E148-E189	57672-57737		nters to subr	
EOA9-EOAD	57513-57517	LLIST	99	11			entry addres	ses associate	d with
EOAE-EOB3	57518-57523	LPRINT	9A	11			BASIC key wo	ord table foun	dat
E0B4-E0B6	57524-57526	SET	9B	11			E045-E0CC		
EOB7-EOBB	57527-57531	RESET	9C	11			Contents	For command	
EOBC-EOBE	57532-57534	CLS	.9D	11	E148-E149	57672-57673	E4C4	FOR	
EOBF-EOC3	57535-57539	SOUND	9E		E14A-E14B	57674-57675	E61A	GOTO	
EOC4-EOC7	57540-57543	EXEC	9F		E14C-E14D	57676-57677	E604	GOSUB	
E0C4-E0C7	57544-57548	SKIPF	A0	11	E14E-E14F	57678-57679	E685	REM	
EOCD-EODO	57549-57552	TAB(Al		E150-E151	57680-57681	E672	IF	
EOD1-EOD2	57553-57554	TO	A2		E152-E153	57682-57683	E651	DATA	
EOD3-EOD6	57555-57558	THEN	A3	ш	E154-E155	57684-57685	E71F	PRINT	
E0D3-E0D0	57559-57561	NOT	A4		E156-E157	57686-57687	E692	ON	
EODA-EODD	57562-57565	STEP	A5	11	E158-E159	57688-57689	E7DE	INPUT	
EODE-EOEO	57566-57568	OFF	A6	П	E15A-E15B	57690-57691	E57F	END	
EOE1	57569	+	A7		E15C-E15D	57692-57693	E8BB	NEXT	
E0E2	57570		A8	11	E15E-E15F	57694-57695	EB12	DIM	
E0E2	57571	*	A9	П	E160-E161	57696-57697	E80E	READ	
EOE4	57572	,	AA		E162-E163	57698-57699	E6D3	LET	
EOE5	57573	'^	AB	11	E164-E165	57700-57701	E5FA	RUN	
E0E6-E0E8	57574-57576	AND	AC	Ш	E166-E167	57702-57703	E560	RESTORE	
EOE9-EOEA		OR	AD	11	E168-E169	57704-57705	E631	RETURN	
EOEB	57579	>	AE		E16A-E16B	57706-57707	E57E	STOP	
EOEC	57580	=	AF		E16C-E16D	57708-57709	EF66	POKE	
EOED	57581	<	B0	11	E16E-E16F	57710-57711	E5A6	CONT	
EOEE-EOFO	57582-57584	SGN	Bl		E170-E171	57712-57713	E40D	LIST	
EOF1-EOF3	57585-57587	INT	B2		E172-E173	57714-57715	E5B8	CLEAR	
EOF4-EOF6	57588-57590	ABS	B3		E174-E175	57716-57717	E3CD	NEW	
EOF7-EOF9	57591-57593	USR	B4	П	E176-E177	57718-57719	FD5C	CLOAD	
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E103-E105	57603-57605	EXP	B8		E17E-E17F	57726-57727	FB25	SET	
E106-E108	57606-57608	SIN	B9	11	E180-E181	57728-57729	FB55	RESET	
E109-E10B	57609-57611	COS	BA	П	E182-E183	57730-57731	FBBF	CLS	
E10C-E10E	57612-57614	TAN	BB	11	E184-E185	57732-57733	FFA5	SOUND	
E10C-E10E	57615-57618	PEEK	BC		E186-E187	57734-57735	FC04	EXEC	
E113-E115	57619-57621				E188-E189	57736-57737	FE2F	SKIPF	
E113-E113	57622-57625	LEN STR\$	BD BE		DI00 DI09	31130 31131	1 11 21	~	
Ella-EllG		VAL		11					
EllD-EllF	57629-57631	ASC	BF CO	11					
E110-E11F	57632-57635	CHR\$	Cl						
E120-E123	57636-57640								
E124-E126 E129-E12E	57641-57646	LEFT\$ RIGHT\$	C2 C3	11					
E129-E12E E12F-E132	57647-57650								
E12F-E132 E133-E137		. MID\$.C4	11					
E133-E13/	57651-57655	POINT	:C5	11					

E18A-E1AF	57738-57775	Table of error messages Error messages
E18A-E18B E18C-E18D E18E-E18F E190-E191 E192-E193 E194-E195 E196-E197 E198-E199 E19C-E19D E19E-E19F E1A0-E1A3 E1A4-E1A5 E1A6-E1A7 E1A8-E1A9 E1AA-E1AB E1AC-E1AD	57742-57743 57744-57745 57746-57747 57748-57749 57750-57751 57752-57753 57754-57757 57758-57757 57760-57761 57762-57763 57764-57765 57766-57767 57768-57769 57768-57769	NF SN RG OD FC OV OM UL BS DD /0 ID TM OS LS ST CN IO FM
E200	57856	Entry to routine to move block of memory: 00BB-00BC holds destination top address 00BD-00BE holds source top address 00BF-00CO holds destination bottom address 00C1-00C2 holds source bottom address
E238	57912	Entry address to routine for error processing. Register B holds error type number on entry.
Ara V		00 for NF 02 for SN
		04 for RG 06 for OD
		08 for FC 0A for OV
		OC for OM OE for UL
		10 for BS 12 for DD
		14 for /0 16 for ID
		18 for TM 1A for OS
		1A FOR US 1C for LS 1E for ST
		1E for ST 20 for CN 22 for IO 24 for FM
E271	57969	Entry to BASIC command level This is the idle loop: print "OK"; tokenize a line and JMP E53D
and the same of th		

HEX	DECIMAL	DESCRIPTION
E3CD E40B E40D E4C4 E560	58317 58379 58381 58564 58720	Entry to NEW routine Entry to LLIST routine Entry to LIST routine Entry to FOR routine Entry to RESTORE routine
E57E E57F E5A6	58750 58751 58790	Entry to STOP routine Entry to END routine Entry to CONT routine
E5B8 E5FA E604 E61A	58808 58874 58884 58906	Entry to CLEAR routine Entry to RUN routine Entry to GOSUB routine Entry to GOTO routine
E631 E651 E672 E685 E692	58929 58961 58994 59013 59026	Entry to RETURN routine Entry to DATA routine Entry to IF routine Entry to REM routine Entry to ON routine
E6D5 E71C E71F	59093 59164 59167	Entry to LET routine Entry to LPRINT routine Entry to PRINT routine
E7A8	59304	Entry to routine to print message on screen: X points to start of message address-1. Address following message must contain 00
E7DE E80E E8BB EB12	59358 59406 59579 60178	Entry to INPUT routine Entry to READ routine Entry to NEXT routine Entry to DIM routine
EBCA	60362	Entry to routine that converts a floating point number to a 16 bit 2's complement integer in D
ECDB	60635	Entry to MEM routine
ECE3	60643	Entry to routine that transforms a 2's complement integer in D to a floating point number in FPACL. Also, if routine is used to exit from USR initiated routine, it passes the integer to BASIC.
ECED	60	Entry to STR\$ routine
ED5F-EE05	60767-60933	Garbage collection routines Entries to:
ED5F ED85 EDCD EDE7	60767 60805 60877 60903	Allocate string in storage buffer Collect garbage Process a descriptor Compact a string

HEX	DECIMAL	DESCRIPTION	HEX	DECIMAL	DESCRIPTION
EE82	61058	Entry to LEN routine	F883	63619	Entry to routine that checks for
EE8E	61070	Entry to CHR\$ routine		00023	character at keyboard: If Z=0 the
EEA2	61090	Entry to ASC routine			character is in register A
EEAD	61101	Entry to LEFT\$ routine			character is in register A
EEC8	61128	Entry to RIGHT\$ routine	F9C6	63942	Determine the southing that subsubs a
EECF	61135	Entry to MID\$ routine	r 9CO	03942	Entry to routine that outputs a
EF1C	61212	Entry to VAL routine			character to device specified by
EF5F	61279	Entry to PEEK routine			the contents of OOE8. Contents
EF66	61286	Entry to POKE routine			of registers are preserved.
			FA10	64016	Entry to rnutine for half bit
EF72	61298	Entry to floating point subtract	TAIO	04010	time delay.
		routine: FPACl=[X]-FPACl			cime delay.
EF7D	61309	Entry to floating point add	FAA4	64164	Entry to line input routine
		routine: FPACl=[X]+FPACl	IAA4	04104	Entry to line input routine
DODO	61625	Patrus to IOC would	FB25	64293	Entry to SET routine
FOB9	61625	Entry to LOG routine	FB55	64341	Entry to RESET routine
			FB9C	64412	Entry to POINT routine
FOEF	61679	Entry to floating point multiply	FBBF	64447	Entry to CLS routine
F1C6	61894	routine: FPACl=[X]*FPACl Entry to floating point divide			
1100	01074	routine: FPAC1=[X]/FPAC1	FBD4	64468	Entry to routine that clears
		rodeline: rfact-[A]/ffact			screen to blanks and homes cursor
F2BA	62138	Entry to SGN routine	FBED	64493	Entry to INKEY\$ routine
F2D5	62165	Entry to ABS routine	FC04	64516	Entry to EXEC routine
F335	62261	Entry to INT routine	FC11	64529	Entry to VARPTR routine
			FC3B	64571	
F419	62419	Entry to routine that displays	LC2P	04371	Entry to CSAVE routine
		decimal value of number in D	FCB1	64689	Entry to routine to write leader,
			. 052	0.000	gap, and 55's
F54D	62797	Entry to SQR routine			
F5C9	62921	Entry to EXP routine	FCCO	64704	Entry to routine that writes bloc
F62A	63018	Entry to RND routine		• • .	Tape should be up to speed and
F686	63110	Entry to COS routine			leader of 55's already written in
F68C	63116	Entry to SIN routine	Market Comment		1st block; 4278-4279 contains
F6D2	63186	Entry to TAN routine			buffer address: 4275 contains blo
					type; 4276 contains the number of
F72E	63278	Entry to routine that performs			
		reset when reset button is pressed			bytes in block
2720	62422		FD5C	64860	Entry to CLOAD routine
F7B2	63410	Entry to routine that transfers	FE2F	65071	Entry to SKIPF routine
		a block:			
		00BF-00C0 holds bottom destination	FEBD	65	Entry to routine that reads a blo
		address			from tape; must be in sync; 4275
		B register holds number of bytes			contains block type; 4276 holds
		to be transferred			block length.
		X points to bottom source address	FF4E	65358	Entry to routine to synchronize
F7C3	63427	Entry to routine for warm restart	FF4E	03330	data (read gap and leader of 55's
		(pointers are not reinitialized)			data (read gap and reader of 55 s
			FFA5	65445	Entry to SOUND routine
F865	63589	Entry to routine that displays			
		cursor and waits for input character			
		from keyboard and puts character			
		in register A			



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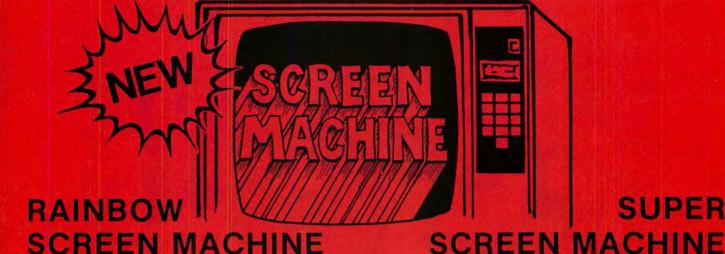
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Corrections

In Bob Tyson's contest winner, *Election '84* (November 1983), you will encounter a BS Error in Line 42 when in the two-player mode. To solve the problem, Bob says to delete Line 42.

Colin J. Stearman reports that a minor bug has emerged in his QSORT program (August 1983). It causes the computer to lock up if both I(0) and I(1) are set to zero. These are the parameters which establish the subscript range to sort upon. Setting these parameters to zero doesn't make much sense as it tells QSORT to sort an array consisting of one element. However, it could happen if these values were set by the program perhaps. To patch the bug, do the following:

- 1. PCLEAR 4(:FILES2,256 if you have disk)
- 2. (C)LOADM"QSORT" at its normal \$E00 starting point.
- 3. POKE&HF36,&HA3
- 4. POKE&HF37,&H8D
- 5. POKE&HF38.&HFE
- 6. POKE&HF39.&HC6
- 7. POKE&HF3A,&H12
- 8. POKE&HF3B,&H12
- 9. POKE&HF43,&H64

10.(C)SAVEM"QSORT",&HE00,&H145D,&HE4E

In Rainbow Technical Editor Dan Downard's article "Remote Operation Of The Color Computer" (November 1983), the Baud rate must be changed. You can do this by *POKEing* &H3F01, &HB8 before running the program.

Larry Konecky reports a bit of discord in "The CoCo Composer" (December 1983). Change Lines 680 and 685 and add Line 686, as follows:

680 IFT=ITHENSAVEMT\$,&H2A00,Q,&H200 ELSE 686

685 GOTO60 686 CSAVEM T\$,&H2A00,Q,&H2C00:GOTO60

In the same article, the musical symbols for numeric values were omitted. Examples of length values are:

 $\int_{0}^{1} = 18$ $\int_{0}^{1} = 36$ $\int_{0}^{1} = 72$ $\int_{0}^{1} = 144$

If you found our directions for loading Tom Weber's four-part *WarGame* (November 1983) less than adequate, you aren't alone. Let's try again:

After all four parts of the program have been typed in and saved to tape, the simulation is ready to be played. To load and play, there are four steps.

1. CLOADM "Part A1"— When this part finishes loading, do not EXEC but rather:

2. CLOAD "Part 2" — When done loading, type RUN and wait for the war room scene to be drawn, which takes approximately one minute. Since this, along with the time it took to load Part 2 is considerable, after completing its picture, Part 2 should be saved to a separate tape as an ML file, which — in future sessions — can be used instead of Part 2 and loaded in with a CLOADM command (no EXEC!). The ML tape you create loads and is ready to go much faster than it took to load and run Part 2. If so desired, after you have RUN and saved Part 2 to tape, you can kill the original BASIC Part 2, since it no longer will be needed to set up the game. 3. CLOAD "Part 3" — This is the instruction program. This program will automatically load in the next one after you type RUN and press [ENTER].

4. When "Part 4" is in, you will see an 'OK" prompt in the lower left corner of the screen. Type RUN, press [ENTER], and the war is on

To start another game after you've finished one, CLOADM "WAR ROOM," which is the name of the ML tape which "Part 2" helped you create. Once loaded, assuming "Part 4" is still in memory, simply type RUN and hit [ENTER] to play again.



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RAINBOW Info

How To Read Rainbow

Please note that all the BASIC program listings you will find in the Rainbow are formatted for a 32-character screen — so they will show up just as they do on your CoCo screen. One easy way to check on the accuracy of your typing is to compare what character "goes under" what. If the characters match — and your line endings come out the same — you have a pretty good way of knowing that your typing is accurate.

We also have "key boxes" to show you the *minimum* system a program needs. But, *do* read the text before you start

typing.

Finally, the little cassette symbol on listings indicates that program is available through our *Rainbow On Tape* service. An order form for this service is on the insert card bound in the magazine.



The Rainbow Seal

The Rainbow Certification Seal is our way of helping you, the consumer. The purpose of the Seal is to certify to you that any product which carries the Seal has been physically seen by us and that it does, indeed, exist.

Manufacturers of products — hardware, software and firmware — are encouraged by us to submit their products to the Rainbow for certification. We ascertain that their products are, in actuality, what they purport to be and, upon such determination, award a Seal. This lets you know that we have seen the product and that it does, indeed, exist.

The Seal, however, is not a "guarantee of satisfaction." The certification process is different from the review process. You are encouraged to read our reviews to determine whether the product is right for your needs.

There is absolutely no relationship between advertising in the Rainbow and the certification process. Certification is open and available to any product pertaining to CoCo. A Seal will be awarded to any commercial product, regardless of whether the firm advertises or not.

We will appreciate knowing of instances of violation of Seal use.

Using Machine Language

Machine Language programs are one of the features of the Rainbow. There are a number of ways to "get" these programs into memory so that you can operate them.

The easiest way is by using an Editor-Assembler, a program you can purchase from a number of sources.

An editor-assembler allows you to enter mnemonics into your CoCo and then have the editor-assembler assemble them into specific instructions that are understood by the 6809 chip that controls your computer.

When you use an editor-assembler, all you have to do, essentially, is copy the relevant instructions from the Rainbow's

listing into CoCo.

Another method of getting an assembly language listing into CoCo is called "hand assembly." As the name implies, you do the assembly by hand. This can *sometimes* cause problems when you have to set up an ORIGIN statement or an EQUATE. In short, you have to know something about assembly to hand assemble some programs.

Use the following program if you wish to hand assemble machine language listings:

10 CLEAR200,&H3F00:I=&H3F80 20 PRINT "ADDRESS:";HEX\$(I); 30 INPUT "BYTE";B\$ 40 POKE I,VAL("&H"+B\$) 50 I=I+1:GOTO 20

This program assumes you have a 16K CoCo. If you have 32K, change the &H3F00 in Line 10 to &H7F00.

What's A CoCo

CoCo is an affectionate name which was first given to the TRS-80 Color Computer by its many fans, users and owners. As such, it is almost a generic term for three computers, all of which are very much alike.

When we use the term CoCo, we refer to the TRS-80 Color Computer, the TDP System-100 Computer and the Dragon-32 Computer. It is easier than using the three "given" names throughout the Rainbow.

In most cases, when a specific computer is mentioned, the application is for that specific computer. However, since the TDP System-100 and TRS-80 Color are, for all purposes, the same computer in a different case, these terms are almost always interchangable.

The Rainbow Check

The small boxes which you see with programs in the Rainbow are our RAIN-BOW CHECK program, which is designed to help you type in programs accurately.

The check program will count the number of characters you type in. You can then compare the number the RAINBOW CHECK gives you to those printed in the Rainbow. On longer programs, some benchmark lines are given. When you reach the end of one of those lines with your typing, simply check to see if the numbers match.

To use the RAINBOW CHECK, type in the program, CSAVE it for future use, then type in the command RUN and press ENTER. Once the program has run, type NEW to remove it from that area into which you will be keying

programs.

Now, whenever you press the down arrow, CoCo will give you the hexadecimal number of bytes in memory. This is to check against the numbers printed in the Rainbow. If your number is different, check the listing carefully to be sure you typed in the proper BASIC program code.

As the hexadecimal number appears in the upper-left corner of the monitor screen, you may want to clear the screen and press the spacebar five or six times to move the cursor out of the way for easy reading. The *RAINBOW CHECK* counts spaces, too, follow the spacing just as it appears in the magazine.

Here's the program:

10 CLS:IF PEEK(116)=127 THEN X=32688 ELSE X=16304 20 CLEAR 25.X-1 30 IF PEEK(116)=127 THEN X=32688 ELSE X=16304 40 FOR Z=X TO X+77 50 READ Y:W=W+Y:PRINT Z,Y;W 60 POKE Z,Y:NEXT 70 IF W=5718 THEN 80 ELSE PRINT "DATA ERROR":STOP 80 EXEC X:END 90 DATA 182, 1, 106, 167, 141, 0, 68 100 DATA 134, 126, 183, 1, 106, 190 110 DATA 1, 107, 175, 141, 0, 57, 48 120 DATA 141, 0, 4, 191, 1, 107, 57 130 DATA 129, 10, 38, 44, 52, 22, 220 140 DATA 27, 147, 25, 142, 4, 0, 141 150 DATA 6, 31, 152, 141, 2, 32, 25 160 DATA 52, 2, 68, 68, 68, 68 170 DATA 141, 4, 53, 2, 132 180 DATA 15, 129, 9, 46, 4, 139, 112 190 DATA 32, 2, 139, 55, 167, 128, 57 200 DATA 53,22,126,0,0

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